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INDIAN CREEK WATERSHED

Lapeer County
Sanilac County
Tuscola County

State of Michigan

FINAL ENVIRONMENTAL IMPACT STATEMENT

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Indian Creek Inter-county Drainage Board, Courthouse,
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Adams Drain Inter-county Drainage Board, Courthouse,
Lapeer, Michigan 48446

October 1974

Prepared By

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

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USDA ENVIRONMENTAL IMPACT STATEMENT

INDIAN CREEK WATERSHED PROJECT

Lapeer County
Sanilac County
Tuscola County

Michigan

Prepared in Accordance with
Sec. 102(2) (C) of P.L. 91-190

SUMMARY SHEET

- I. Final
- II. Soil Conservation Service
- III. Administrative (X)

IV. Description of Project Purpose and Action:

The purposes of the project are watershed protection, flood prevention and improved drainage on land in the Indian Creek Watershed which is located in Lapeer, Sanilac, and Tuscola Counties of Michigan. The planned project action consists of conservation land treatment measures and multiple-purpose channel work.

V. Summary of Environmental Impact Including Favorable and Adverse Environmental Effects:

Reduce gross sheet erosion by 31 percent.
Reduce sheet erosion on cropland by 35 percent.
Reduce sediment leaving watershed by 31 percent.
Reduce surface water runoff by 2-4 percent.
Reduce annual fossil fuel consumption by 7,200 gallons.
Provide wildlife food and cover through land treatment practices.
Increase productivity on 301 acres of forest land.
Reduce agricultural flood damages by 60 percent.
Increase agricultural efficiency on 1,324 acres.
Increase the dissolved oxygen content of water in 1.9 miles of channel.
Reduce flood hazard to wildlife.
Increase wildlife habitat value of channel rights-of-way by a value equivalent to 18.9 acres.
Increase erosion and sediment for up to three years on 1.9 miles of Adams Drain.
Change 17.1 acres of forest land to grassland.
Lower densities of aquatic flora and fauna 5-10 years in 2.8 miles of stream channel.
Loss of wildlife cover along 2.8 miles channel for up to three years.
Noise pollution from construction will exist for 3 months.

Change 220 acres of grassland and brushland to cropland.
Loss of fossil fuels used in construction work.

VI. Alternatives:

1. Accelerated conservation land treatment only.
2. Acquisition of problem area properties for a preserve.
3. Accelerated conservation land treatment and 16.1 miles of channel work.
4. No project.

VII. Agencies from which Comments have been Received:

Department of the Army
Department of Health, Education and Welfare
Department of the Interior
Department of Transportation
Environmental Protection Agency
Advisory Council on Historic Preservation
Federal Power Commission
Great Lakes Basin Commission
Governor of Michigan, Response by Michigan Department of
Natural Resources

VIII. The draft environment impact statement transmitted to CEQ
on April 14, 1974.

USDA SOIL CONSERVATION SERVICE
FINAL ENVIRONMENTAL IMPACT STATEMENT

for

INDIAN CREEK WATERSHED

Lapeer, Sanilac, Tuscola Counties, Michigan

Installation of this project constitutes an administrative action. Federal assistance will be provided under authority of Public Law 83-566, 83d Congress, 68 Stat. 666, as amended.

SPONSORING LOCAL ORGANIZATIONS

Lapeer County Soil Conservation District
Sanilac County Soil Conservation District
Tuscola County Soil Conservation District
Indian Creek Inter-county Drainage Board
Adams Drain Inter-county Drainage Board

PROJECT OBJECTIVES AND PURPOSES

The primary purposes of the local sponsoring organizations are watershed protection through conservation land treatment, flood prevention, and improved agricultural drainage on existing crop and pasture lands.

Conservation land treatment measures will help fulfill the sponsors' goals of reducing runoff, erosion, and sediment; improving production efficiency on crop, pasture, and forest land; and improving fish and wildlife habitat for increased recreational and aesthetic enjoyment. Land treatment objectives are to adequately treat 2,750 acres of cropland, 600 acres of pasture, 600 acres of forest land, and 270 acres of other land. The following achievements are expected: reduce overall surface runoff by two percent; reduce gross sheet erosion rate for the watershed to 1 ton/acre/year; reduce sheet erosion on cropland to 1.5 tons/acre/year; reduce sediment leaving the watershed to less than 2,000 tons per year; increase agricultural efficiency on 2,750 acres of cropland; reduce fossil fuel consumption by 7,000 gallons, annually, as a result of minimum tillage; and improve recreational and aesthetic resources in the watershed.

Structural measures will be used to obtain the goal of reducing flooding along Indian Creek and Adams Drain. The desired level of flood protection of three years was acceptable throughout because of the homogeneous land use in the problem area. Reduced flooding to 570 acres will be provided.

Structural measures will also be used to obtain the goal of improving drainage on 2,225 acres. Increased channel depth and capacity are expected to increase agricultural efficiency on 1,324 acres of cropland by allowing farmers to get into their fields sooner and by increasing quality, intensity of land use, yield, and efficiency of use of land, labor and capital. The types of crops in the problem area require moderately well drained soils and cannot tolerate saturated soil moisture conditions for an extended period of time. Seasonally high water tables at or near the surface will be lowered about three feet to provide adequate root zone depth for corn, small grain, and hay. To obtain optimum yields these crops must be planted as early as possible in the spring to utilize the full length of the growing season.

PLANNED PROJECT a/Land Treatment

The land treatment program planned to be installed during the project includes practices that will adequately treat an additional 2,750 acres of cropland, 600 acres of forest land, 600 acres of pasture land and 270 acres of other land. Many of the remaining acres in the watershed will be partially protected or treated.

Technical assistance will be provided for conservation planning and information and education services. During the installation period, 45 new conservation plans will be prepared. Conservation plans are the properly recorded decisions of the cooperating land owner or operator on how he plans to use his land within its capability and to treat it according to its needs for maintenance or improvement of the soil, water, and plant resources. Assistance will also be provided through the preparation of forest land management plans for 30 landowners.

Practices to be applied on cropland include conservation cropping systems, crop residue use, critical area planting, grade stabilization structures, grassed waterways, minimum tillage, drainage mains or laterals, drainage field ditches and drains:

Practices to be applied on pastureland include pasture and hayland management and pasture and hayland planting.

Practices to be applied on forest land include harvest cutting, 100 acres; grazing control, 200 acres; tree planting, 100 acres; forest wildlife habitat improvement, 50 acres; and timber stand improvement, 250 acres.

Practices to be applied on other land include grassed waterways, ponds, fishpond management, wildlife upland habitat management, and wildlife wetland habitat management. Conservation land treatment practices are defined in Appendix A.

Technical assistance will be made available to private landowners through the going programs of the Lapeer, Sanilac, and Tuscola County Soil Conservation Districts in cooperation with the Soil Conservation Service, and the Michigan Department of Natural Resources in cooperation with the U. S. Forest Service under the cooperative forestry programs.

a/ All information and data, except as noted, were collected during watershed planning investigations by the Soil Conservation Service, U. S. Department of Agriculture.

Structural Measures

The structural measures included in the plan consists of approximately 7.7 miles of multiple-purpose (flood prevention and drainage) channel work, all in Lapeer County. Location of these measures are shown on the project map (See Appendix G). Also included for the total channel work are the following construction items and estimated quantities: clearing and grubbing, 9.3 acres; clearing, 4.1 acres; channel excavation, 30,740 cubic yards; surface water inlets for erosion control, 92; tile outlets, 46; riprap, 79 cubic yards; diversion ditches, 7,000 feet; clearing and snagging, 4.9 miles; seeding and mulching, 24.5 acres; bridge replacements, two (on Adams Drain); drop structure, one with 185 cubic yards of rock and filter (on Adams Drain); sediment basins, one (on Adams Drain); fencing, 215 rods (on Indian Creek); and land easements, 115.7 acres.

INDIAN CREEK

In reach #1 (see Exhibit 8) for the 0.9 miles between the west Marlette Road crossing and the Chesapeake Railway the channel is shallow, lacks capacity and is aggrading. Channel banks contain brush and other vegetative growth except for three sub-reaches with woods on one side. Flow condition is ephemeral. The channel was previously modified about 65 years ago.

Materials along the channel are largely poorly graded sands capable of withstanding low to moderate flow velocities.

In reach #1, the constructed channel will be 4.2 feet deep and have a bottom width of 4 feet. Channel alignment will follow the present channel.

In the non-wooded areas, the channel will have a 15 foot berm constructed on each side, and the spoil material will be divided and shaped (see exhibit 1). Within this reach there are three sub-reaches with woods on one side only. A 15 foot berm will be constructed on the non-wooded side and all the spoil material will be placed and shaped on that side. Construction work will be accomplished from the non-wooded side only (see exhibit 2).

Geologic investigation data were used to check stability. The tractive force method used indicated the channel section might be unstable during the interim between construction and the establishment of permanent vegetative cover. The construction cost estimate for this reach was increased to allow for repair of any portion that might be damaged from heavy flows during the establishment period. The sponsors agreed to fund their share of any such stabilization effort in the same ratio as that for original construction. Minor structural measures such as reshaping of the constructed channel and rock toes, and prompt establishment of adequate vegetative cover.

To expedite control of possible bank erosion, daily seeding will be done during the final shaping operation for the portion completed that day.

Channel side slopes, berms, and inside slopes of the spoil banks from the berm level to the top of the spoil bank or to a minimum total width of 20 feet from the edge of the channel bank, whichever is greater will be seeded to cool season perennial grasses after completion of the final shaping operation. These seeded areas will be preserved for erosion control and wildlife use.

In reach #2 with a length of 2.5 miles between the Chesapeake Railway and the confluence of Negus Drain with Indian Creek immediately east of the Grand Trunk Railway, the channel was previously modified about 65 years ago and generally has adequate depth and size. Channel capacity has gradually been reduced because of growth of brush on channel banks with dead trees and branches having fallen into the channel area. The channel is aggrading and the flow condition is ephemeral.

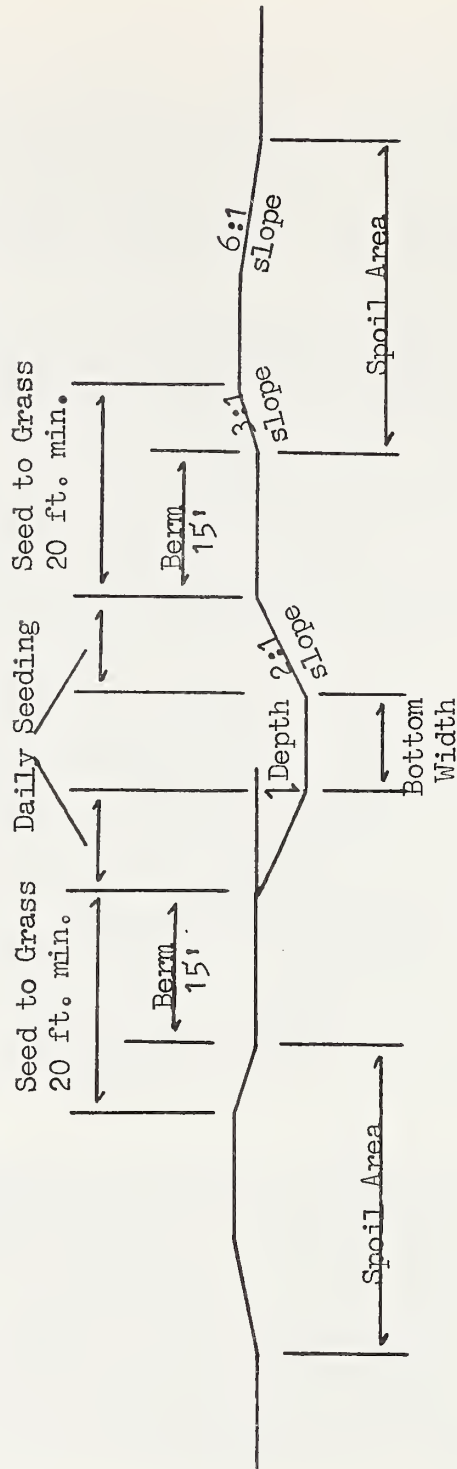
Materials along the channel are largely clays with low plasticity capable of withstanding moderate flow velocities.

In reach #3, which has a length of 2.4 miles and is located between the Grand Trunk Railway and the Millington Road crossing at the downstream end of the proposed work, the materials along the channel are the same as in reach #2 except that the flow condition is perennial. This section of the channel was also previously modified about 65 years ago. There is a considerable amount of brush and debris in the channel. A valuable oak-maple wooded area exists in Section 9, T10N, R11E. It will not be affected by project action. Cattle access to 1,775 feet of Indian Creek above Jefferson Road has exposed raw banks and caused erosion problems.

In reaches 2 and 3 totaling approximately 4.9 miles in length, the work will consist of clearing and snagging of the existing channel section. Existing alignment will be followed.

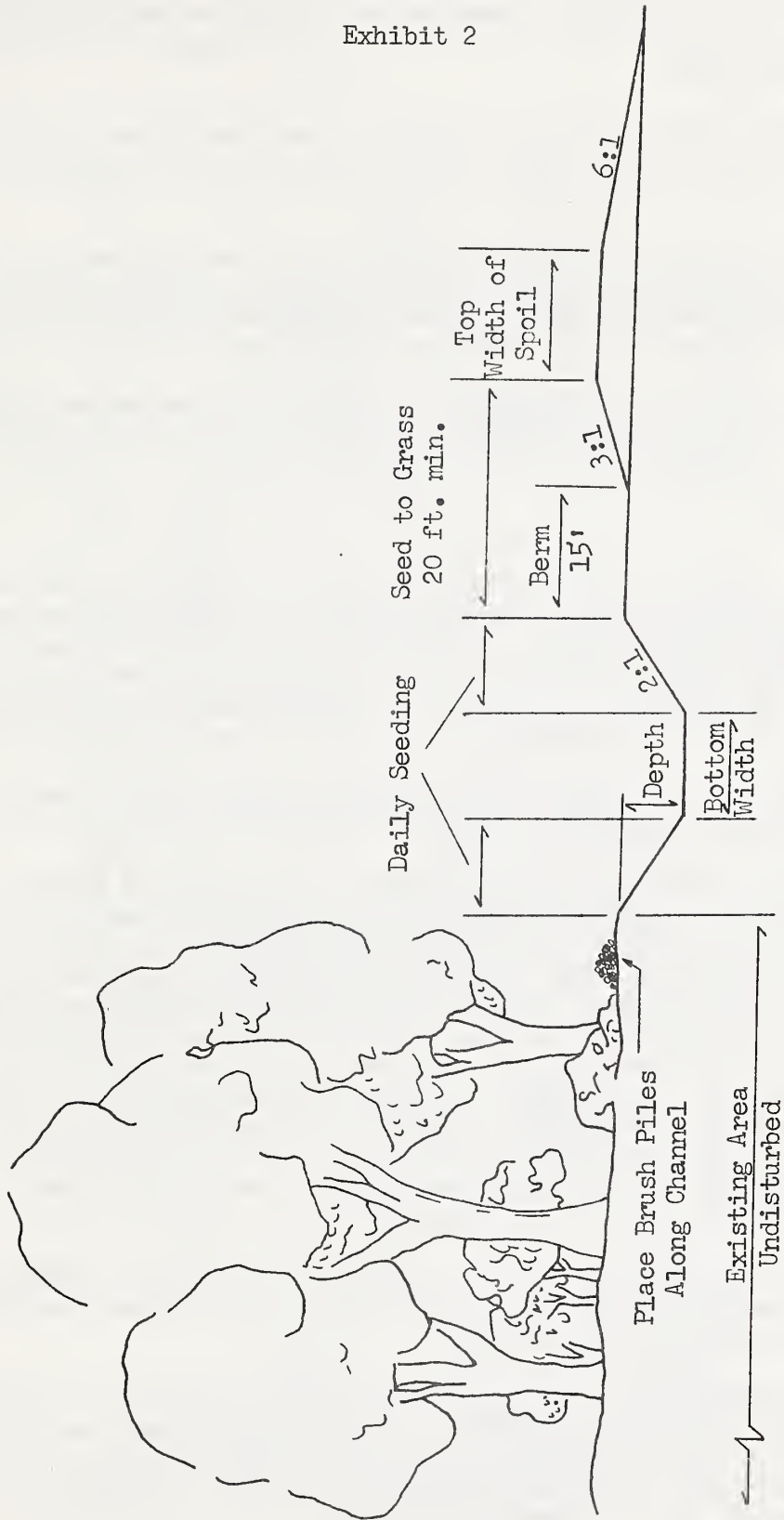
Clearing will be done as necessary on one side of the channel to provide a 15 foot travelway for work and maintenance with the exception of a wooded area encompassing the entire southwest 1/4 of the southeast 1/4 of Section 9, T10N, R11E and for an additional distance of 100 feet both upstream and downstream. This area will be preserved against any clearing other than hand clearing and snagging in the existing channel. The travelway will be located on the north and west side of the channel upstream from the above mentioned woodland area and on the south and east side of the channel downstream from this area. All disturbed areas will be seeded to cool season perennial grasses, and the entire travelway will be preserved for maintenance.

The clearing and snagging portion of the Indian Creek channel will be limited to close cutting of the trees and brush within the existing channel. The standing trees along the channel which are dead or diseased and which may impair the functioning of the channel as a result of wind-falls will also be removed. The cut materials and debris will be piled in suitable locations on the side of the channel opposite the travelway when possible (see exhibit 3 and 3a). They will be arranged to provide wildlife cover where it will not impede drainage of surface water or stream flow.



TYPICAL CHANNEL SECTION

NON-FORESTED AREAS



TYPICAL CHANNEL CROSS SECTION

FORESTED AREA ON ONE SIDE

The Michigan Department of Natural Resources will provide consultative services through the Soil Conservation Service to the project engineer during the construction phase when areas involving forest land resources are affected.

One-third of a mile of fencing will be installed on both sides of Indian Creek above Jefferson Road to keep livestock from damaging channel banks.

Backwater problems, in the reach from the outlet for Indian Creek into the North Branch of the Flint River upstream to Barnes Road, and the lack of problem area in the reach between Barnes Road and Millington Road crossings preclude beneficial effects from channel work.

The reaches on the upstream portion of Indian Creek between Slattery Road and the second or West Marlette Road crossing also lack the necessary problem area to be included in the proposed project.

ADAMS DRAIN

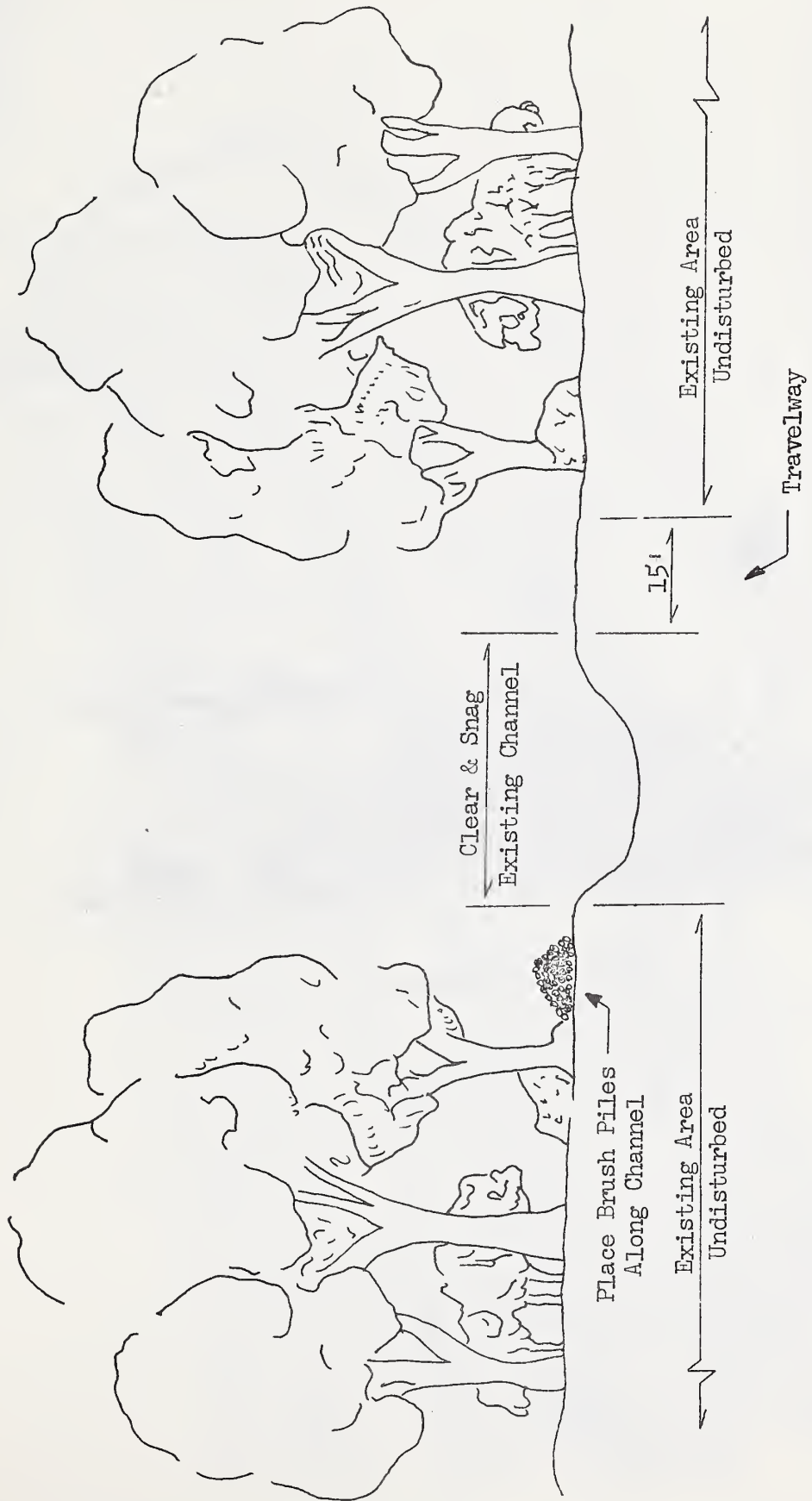
The total reach for the 1.9 miles between the Clifford Road crossing and the confluence with Indian Creek is generally shallow, lacks capacity and is in a non-erosive condition. The flow condition is ephemeral. The channel was first modified about 65 years ago, and was cleaned out again 20 years ago. The channel is located in a predominately agricultural area except for two areas. Brush and grass cover the immediate channel section.

Materials along the channel are generally clays of low plasticity capable of withstanding moderate flow velocities.

In the total reach length of 1.9 miles of channel work between Clifford Road and the confluence with Indian Creek, the constructed channel will be 4.2 feet deep and have a bottom width of 10 feet. In the non-wooded areas, a 15 foot berm will be constructed on each side of the channel with the spoil material being evenly divided and shaped (see exhibit 1). In two sub-reaches with woods on both sides of the channel, clearing will be kept to a minimum to preserve forest land and wildlife habitat. Clearing will be done on the west side of the channel only in both sub-reaches to include a 15 foot berm, a spoil area and a small additional area to be cleared as necessary for construction of a collection ditch to divert runoff water to surface water inlet location points (see exhibit 4).

To provide nesting areas and for protection of wildlife species, the spoil bank may be narrow and somewhat higher than normal, requiring a minimum of shaping (see exhibit 5).

Daily seeding of all excavated channel side slopes will be done during the final excavation operation for the portion completed that day. All seedings will be applied at the following rate per acre: 10# creeping red fescue, 20# tall fescue, 2# Kentucky bluegrass, 1# redbud, 2# timothy, and 5# birdsfoot trefoil.



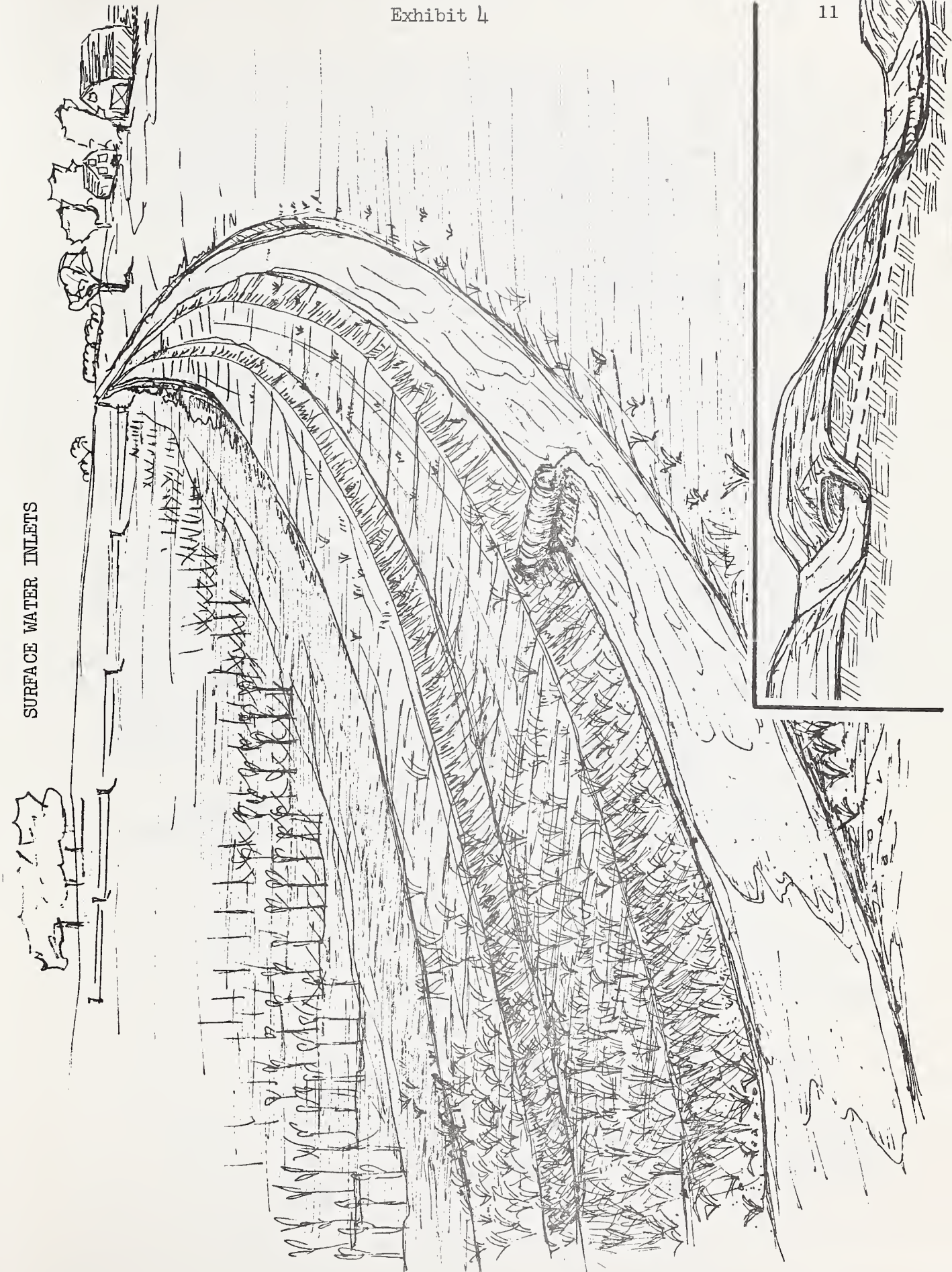
TYPICAL CHANNEL CROSS SECTION

CHANNEL WORK BY CLEARING AND SNAGGING



WILDLIFE BRUSH PILES

SURFACE WATER INLETS



In the non-wooded area all channel slopes, berms, and inside slopes of the spoil banks from the berm level to the top of the spoil bank or to a minimum total width of 20 feet from the edge of the channel bank, whichever is greater, will be seeded to grasses after completion of the final shaping operation. In the two wooded sections in addition to seeding of the channel banks and berms, the total unshaped spoil bank area will be seeded to grasses by a broadcasting method. All seeded areas will be preserved for erosion control and wildlife use.

A rock drop structure will be constructed immediately downstream from Clifford Road to lower the grade about 2 feet to obtain adequate depth in that area and to decrease the slope to insure channel stability (see exhibit 6).

A sediment basin will be located 860 feet upstream from the confluence with Indian Creek immediately upstream from a wooded area. The basin will trap sediment during the construction period and until permanent vegetative control is established (see exhibit 7).

Two road crossings are to be replaced: one at Markle Road and the other at Murphy Lake Road.

The Indian Creek watershed project has been coordinated with the Michigan History Division, Michigan Department of State. Investigations indicate that installation of the project will not encroach on any known archeological, architectural or historical data, sites or specimens. The project will not result in the transfer, sale, demolition or alteration of any Federally owned properties or eligible National Register properties, nor will it contribute to the preservation and enhancement of non-federally owned districts, sites, buildings, structures and objects of historical, architectural or archeological significance. If artifacts are uncovered during construction, the Michigan History Division and the United States Secretary of the Interior will be notified.

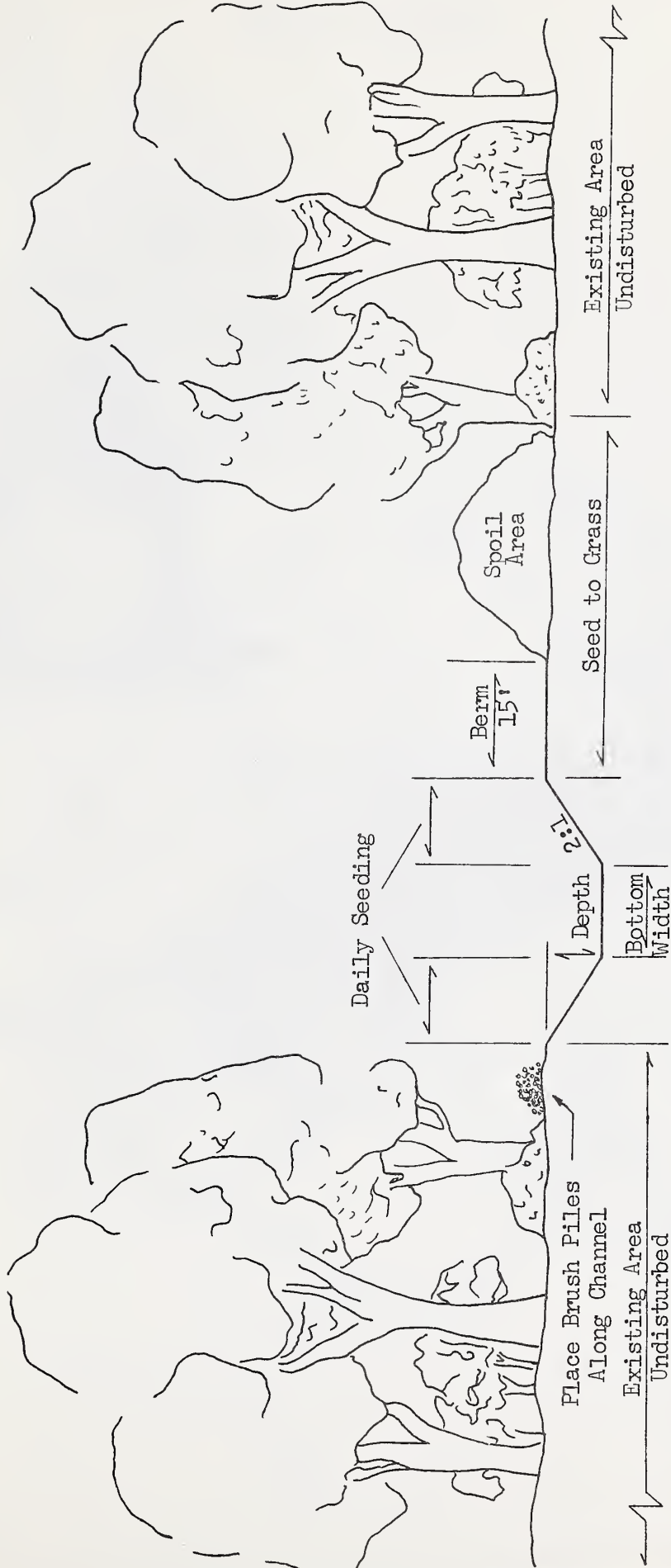
Wetland areas identified on Exhibit 8 will not be drained by project action. Wetland areas in the benefited area are located where no channel deepening will take place.

Land Use Changes

Permanent land use changes within the rights-of-way due to the project are as follows:

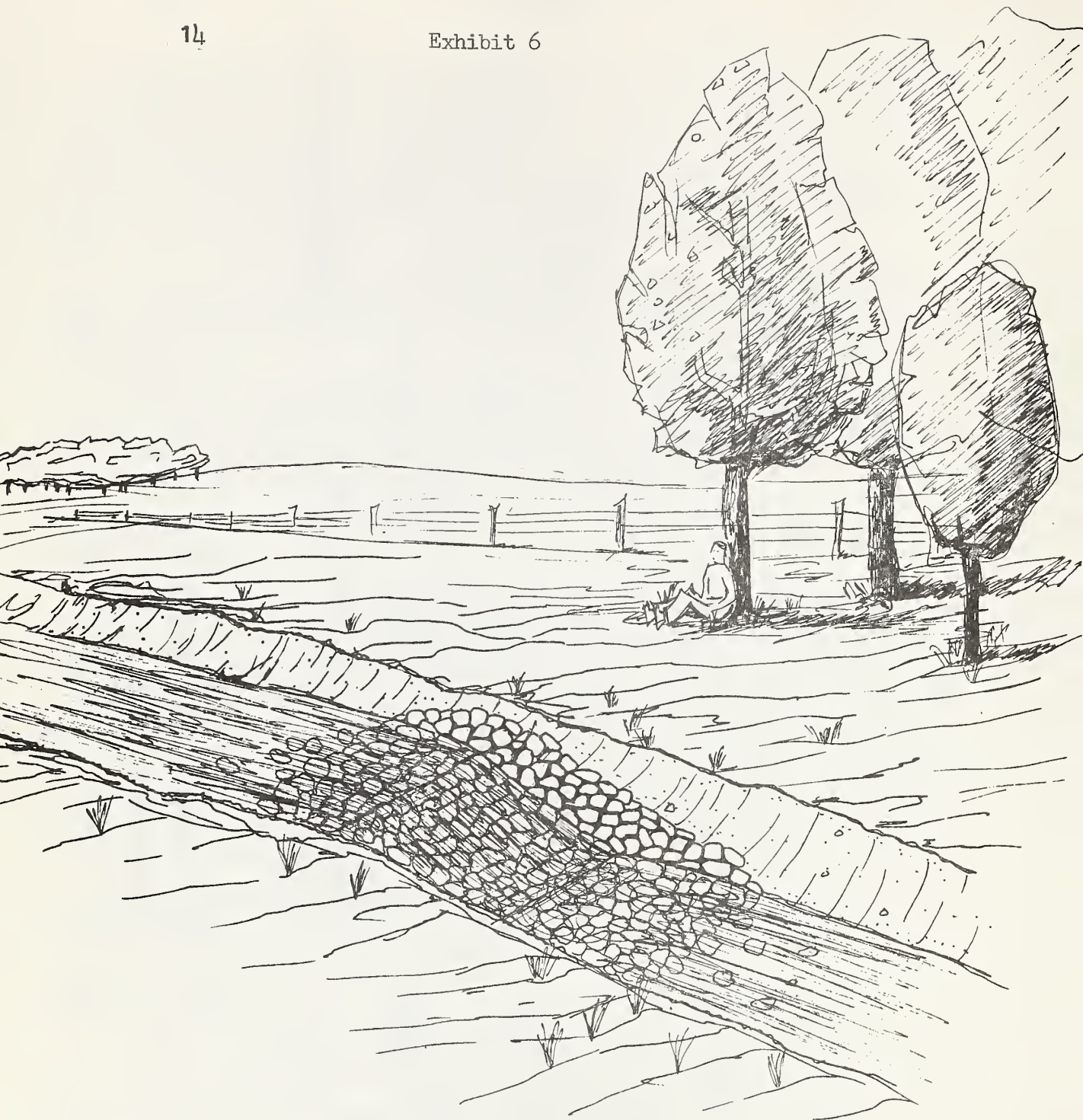
PERMANENT LAND USE CHANGES IN THE RIGHTS-OF-WAY

<u>Land Use</u>	<u>Acres Without Project</u>	<u>Acres With Project</u>
Cropland	22.0	0
Forestland	17.1	0
Grassland	<u>24.5</u>	<u>63.6</u>
	63.6	63.6



TYPICAL CHANNEL CROSS SECTION

FORESTED AREAS ON BOTH SIDES



ROCK DROP STRUCTURE



Operation and Maintenance

An establishment period not to exceed three years is provided for the channel work and associated vegetative cover. During this period the Soil Conservation Service may use PL-566 funds to cost share on any repairs or other work resulting from unknown site conditions or latent defects. The cost of repairs will be shared in the same ratio as the original structure. Cost of work under this provision will be limited to 10 percent of the contract cost. Type of work includes minor structural measures such as reshaping of the constructed channel and rock toes, and prompt establishment of adequate vegetative cover.

The following items will be provided for in the maintenance program.

1. A joint inspection will be made annually or after unusually severe storms by a representative of the respective drainage boards and by a representative of the Soil Conservation Service.

2. After an initial three-year period of joint inspection, the works of improvement will be inspected annually by the sponsors. A copy of the report prepared by them will be sent to the Soil Conservation Service representative.

3. All costs for labor, equipment, and materials for operation and maintenance will be furnished by the appropriate sponsoring organization.

4. Maintenance rights-of-way to the structural measures will be furnished by the sponsoring organization to provide access for maintenance work.

5. Maintenance work on seeded areas by mowing or spraying should be done at a time which will allow for completion of the nesting season, preferably after July 15.

6. A record will be made of all inspections with one copy for the sponsoring organization and one copy for the Soil Conservation Service.

7. A specific maintenance agreement between the Soil Conservation Service and the appropriate sponsoring organization will be executed prior to executing the project agreement.

The continued functioning of the multiple-purpose channel work in providing the degree of flood protection for which they are designed and for serving as adequate drainage outlets will require a timely maintenance program. This work will include control of undesirable vegetal growth by mowing and/or spraying, with environmentally safe chemicals, reshaping of eroded banks, and removing any sediment bars from the channels.

Installed land treatment measures will be maintained by the landowners, operators, and responsible land managers.

Project Costs

Total Installation Cost	-	\$ 414,600
PL-566 Funds	\$	184,200
Other		230,400

Total Construction Cost	-	\$ 154,900
PL-566 Funds	\$	116,200
Other		38,700

Cost Allocation

Costs for the multiple-purpose (flood prevention and drainage) channel work were allocated equally to each purpose. This resulted in the allocation of \$100,350 to flood prevention; and \$100,350 to drainage.

Installation Period

The installation of the project will be accomplished in a period of 5 years. An estimated schedule of PL-566 and other obligations is as follows:

PROJECT COSTS

<u>FISCAL YEAR</u>	<u>PL-566</u>	<u>Other</u>	<u>Total</u>
		(Dollars)	
FIRST			
Land Treatment	9,330	22,810	32,140
Structural Measures	17,800	36,000	53,800
SECOND			
Land Treatment	6,640	28,940	35,580
Structural Measures	129,400	40,900	170,300
THIRD			
Land Treatment	7,750	38,070	45,820
Structural Measures	-	-	-
FOURTH			
Land Treatment	7,750	38,570	46,320
Structural Measures	-	-	-
FIFTH			
Land Treatment	5,430	25,210	30,640
Structural Measures	-	-	-

ENVIRONMENTAL SETTING

Physical Resources

The Indian Creek Watershed is located in portions of Lapeer, Sanilac, and Tuscola Counties in the Lower Peninsula of Michigan. This watershed is 6 1/2 miles long and 7 1/2 miles wide at its widest point and includes 20,360 acres (31.8 square miles). The population of the watershed is approximately 1,150.

The only village or town in the watershed is Clifford, which has a population of 472. Flint, with a population of 193,000, is the nearest large city. It is located approximately 40 miles southwest of the watershed. Marlette, with a population of 1,766, is located two miles east of the watershed. North Branch, with a population of 901, is located three miles south of the watershed on Michigan Highway 90. Mayville, with a population of 896, is located six miles west northwest on Michigan Highway 24. (8)

The Indian Creek Watershed is located in the Flint River Subbasin of the Saginaw River Basin. The Saginaw River Basin is located in the Lake Huron Subregion of the Great Lakes Water Resource Region. It lies in the Southern Michigan Drift Plain Land Resource Area of the Lake States Fruit, Truck and Dairy Land Resource Region. (12)

Floodwater damage and impaired drainage are a major soil and water resource problem of the watershed. Inadequate channel depth and capacity allow flooding and cause impaired drainage on approximately 2,225 acres of agricultural land. Slow natural drainage reduces forest productivity for marketable wood products. As a result of Dutch Elm disease, dead elm trees along streambanks have fallen into the channels. The problem area being considered for this work plan begins on Indian Creek just north of Marlette Road in Tuscola County immediately over the Tuscola County Line, in Section 33, T11N, R11E, and extends southwest along Indian Creek to the Millington Road, in Section 18, T10N, R11E. Also being considered is an area along the Adams Drain from Clifford Road, in Section 5, T10N, R11E, south to its confluence with Indian Creek. There is also an inadequate drainage outlet for the area along the McKillop Drain from the eastern edge of Section 7, T10N, R11E, south to its confluence with Indian Creek.

Indian Creek Watershed contains three soil associations; the Capac-Belding-Brookston association, the Roselms-Paulding association, and the Boyer-Oshemo-McBride association. The Capac-Belding-Brookston association consists of somewhat poorly and poorly drained loamy soils. The Roselms-Paulding association consists of somewhat poorly drained clay soils. The Boyer-Oshemo-McBride association consists of well drained sandy and loamy soils. A soil association is a landscape that has a distinctive, proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil. A description of each soil is presented in Appendix B. (9) (14) (15)

The problem area consists of both organic and mineral soils. In most cases, these soils are poorly drained with high or seasonal high water tables, moderate to wide crop adaptability, and pose severe limitations to crop production if not drained.

The western half of the watershed is in glacial lake clays of Wisconsin age. The eastern half of the watershed is in moraine and ground moraine that vary from loam to sand to gravel. There are some recent alluvial deposits of sand and silt in the lower end of Indian Creek. (3)

Topography in the watershed varies from nearly level to rolling. Stream gradients are relatively low. Elevations within the watershed vary from 900 feet above mean sea level in the eastern portion to 790 feet above mean sea level in the southern portion. (18)

There are no U.S. Weather Bureau Stations in the watershed. One precipitation and temperature station is located near Lapeer, Michigan, about 23 miles southwest of the watershed. The station was established in 1896. Pertinent climatic data from this station are as follows:

CLIMATIC DATA LAPEER STATION (2)

January average temperature	22.8 degree F
July average temperature	71.0 degree F
Maximum temperature recorded	105.0 degree F
Minimum temperature recorded	-26.0 degree F
Last killing frost in spring (avg.)	May 13
First killing frost in fall (avg.)	Oct. 7
Average length of growing season	148 days
Average annual precipitation	28.48 in.
Maximum annual precipitation (1945)	40.53 in.
Minimum annual precipitation (1964)	22.22 in.
Maximum 24-hour precipitation (July 21, 1948)	4.70 in.
Percent of average annual total precipitation received during the six months April through September	62%

Bedrock groundwater is available at a rate of 100-500 gallons per minute at an 8 inch or larger well. Glacial groundwater is available at a rate of 10-100 gallons per minute. Soil infiltration rates for this area are generally 1.0 - 2.0 inches per hour. (4) An adequate supply of groundwater is available for domestic and agricultural needs.

There are no known surface or subsurface mineral resources in the area.

The village of Clifford, population 472, has a public water distribution system. The supply comes from a 400 foot deep well dug in 1936 and has a capacity of 270 GPM. There is also a 20,000 gallon elevated storage tank. The system is adequate for present needs although some

planning has been undertaken to obtain a second well. No information is available as to the quality of water from the existing well. Other homeowners in the watershed rely on individual wells. Supply is adequate for future needs.

The land use pattern in the watershed is shown in the table below.

PRESENT WATERSHED LAND USE PATTERN

<u>Land Use</u>	<u>Acres</u>	<u>Percent</u>
Cropland	10,990	54
Pasture Land	1,630	8
Forest Land	4,480	22
Other	<u>3,260</u>	<u>16</u>
TOTAL	20,360	100

Cash cropping and dairying are the major types of farm enterprise with beef production and truck crops playing a minor role in the agricultural economy. The major crops are corn, wheat, oats, hay, and a small amount of soybeans.

The forest land is held in about 125 private ownerships ranging in size from 5 to 100 acres. The average forest ownership is about 20 acres. The Michigan Department of Natural Resources coordinates the town fire departments to assure that fire protection is less than the state's fire loss index goal of 0.1 percent per year. (11)

Surface water resources in the watershed are generally confined to stream channels and drains. Indian Creek begins near the Lapeer and Sanilac County boundary and flows west for about 1 1/2 miles, then flows north into Tuscola County. It then flows west for about 1 mile and then generally southwest in Lapeer County for about 7 miles where it empties into the North Branch Flint River. Adams Drain begins in Tuscola County and flows south where it empties into Indian Creek, in Section 17, T10N, R11E. Negus Drain begins in Sanilac County and enters Lapeer County flowing in a northwest direction where it empties into Indian Creek, in Section 9, T10N, R11E. McKillop Drain begins in the west portion of the watershed and flows in a southeasterly direction and empties into Indian Creek, in Section 17, T10N, R11E. South Clifford Drain begins in Tuscola County and flows south past Clifford and joins Indian Creek, in Section 10, T10N, R11E. Channel characteristics are given in the table below.

CHANNEL CHARACTERISTICS (18)

<u>Channel Name</u>	<u>Length in Miles</u>	<u>Type of Channel a/</u>	<u>Flow Condition b/</u>
Indian Creek			
Headwaters to Clifford Rd/	4.1	M	E
Clifford Rd. boundary Sec. 9 & 16	1.7	M	I
Sec. 9 & 16 to N. Br. Flint River	6.1	M	Pr
South Clifford Drain	3.7	M	I
Negus Drain	16.7	M	I
Adams Drain	6.3	M	E
McKillop Drain	4.2	M	E

a/ M - Man-made ditch or previously modified channel

b/ E - Ephemeral, I - intermittent, Pr - perennial

Sloughing and caving of banks resulting from livestock grazing along portions of the channels have caused partial blocking of channels. Brush, wood debris and semi-aquatic vegetation impedes water flow in many areas. The following table indicate general bottom condition in most channels.

CHANNEL BOTTOM CHARACTERISTICS

<u>Channel Location</u>	<u>Bottom Type</u>
Indian Creek at Clifford Road	2-4 inches organic debris over sand, woody debris present
South Clifford Drain in Clifford	36 inches and greater of organic sludge, woody debris present
Negus Drain at Lake Pleasant Road	3-8 inches of organic sludge over sand
Adams Drain at Marble Road	6-24 inches of organic sludge over sand mixed with undecomposed organic fiber
McKillop Drain at Hathaway Road	2-6 inches organic sludge over 36 inches and greater of organic fiber
Indian Creek at Hathaway Road	Mostly sand and gravel mixed with small amounts of organic fiber

All the streams and drains in the watershed are classified by the Michigan Department of Natural Resources as second quality warm water feeder streams. A second quality warmwater feeder stream is defined as being too small to permit fishing with all standard gear, and too small to support a game fish population composed of individuals large enough to provide a satisfactory fishery. Value of contribution to mainstream limited by highly fluctuating stream flow, and/or presence of heavy silt load or other pollution. (5) Base flow of Indian Creek at Millington Road is less than one cubic foot per second.

Clifford has no existing public sewage system. There are minor signs of organic pollution in South Clifford Drain. Clifford has been cited for polluting surface waters by the Michigan Water Resources Commission. The village has requested the service of a private engineering firm to investigate the possibility of a sewage lagoon. Pollution from livestock waste also occurs in pastures where livestock have free access along 1,775 feet of stream. No other records are available from State or Federal agencies which indicate the presence of additional stream pollutants.

The Michigan Water Resources Commission has established designated uses for all waters in the state. (6) For Indian Creek they are: 1) Warmwater Fish (including but not limited to basses, pike, walleye, and panfish); 2) Partial Body Contact Recreation; 3) Public Water Supply at the Point of Water Intake; 4) Agriculture; 5) Irrigation; and 6) Industrial Water Supply.

There are several wetlands occurring throughout the watershed area. These are defined as lowlands covered with shallow and sometimes temporary or intermittent waters. Wetland types classified by the Bureau of Sport Fisheries and Wildlife (17) found in the Indian Creek Watershed are as follows: 13 Type 3 (inland shallow fresh marshes) totaling 159.6 acres; 2 Type 4 (inland deep fresh marshes) totaling 41.1 acres; 1 Type 5 (inland open fresh water) totaling 0.5 acre; 3 Type 6 (shrub swamps) totaling 88.9 acres; 8 Type 7 (wooded swamps) totaling 148.8 acres; and 3 Type 8 (bogs) totaling 55.1 acres. (Refer to Exhibit 8 for location). There are approximately 18 farm ponds, average 0.5 acre scattered throughout the watershed.

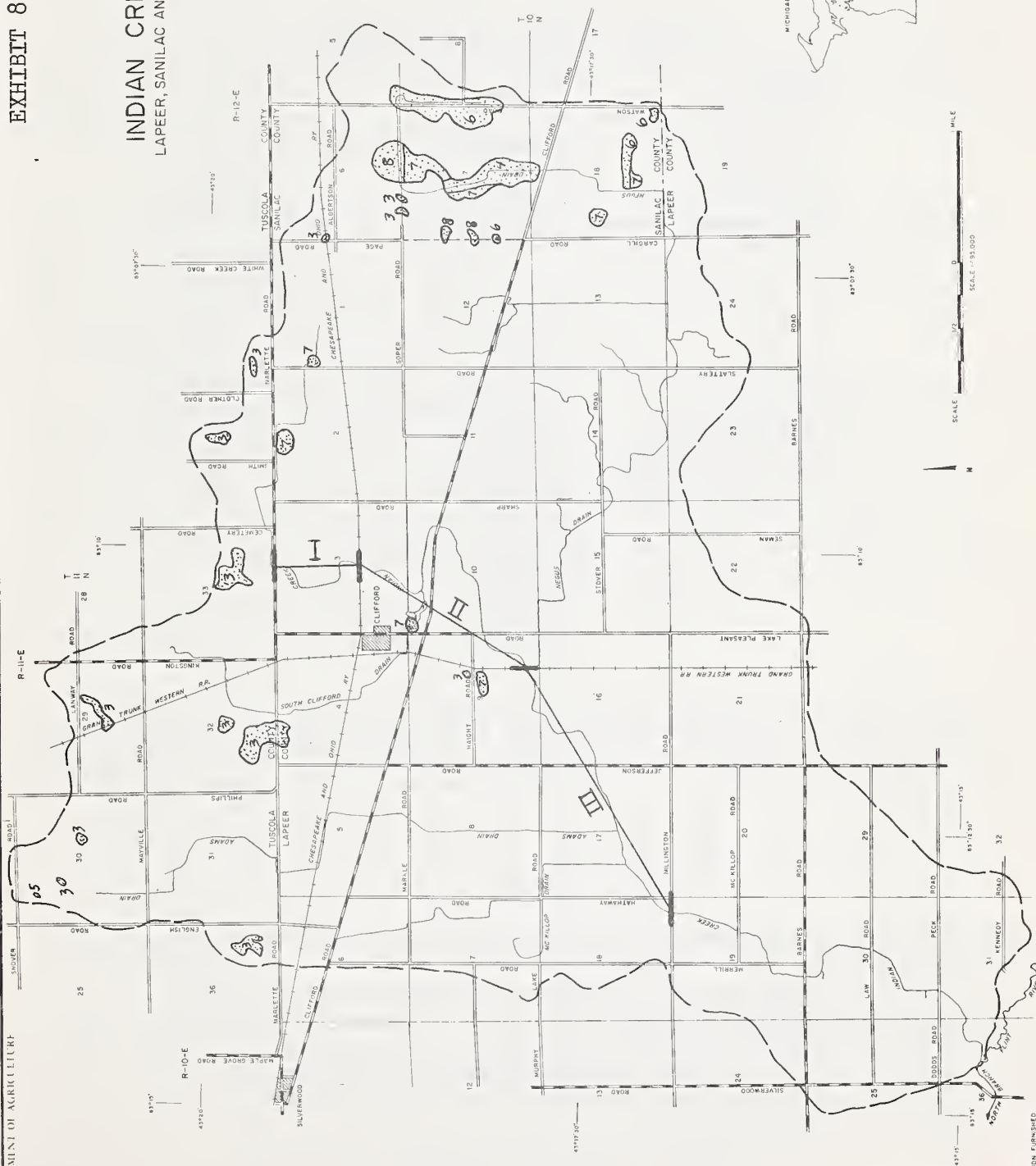
Plant and Animal Resources (Flora and Fauna)

The major timber types are oak-hickory, beech-birch-maple, and elm-ash-cottonwood. These types comprise 15 percent, 20 percent, and 65 percent of the forested area, respectively. The stands are generally well stocked and are potentially productive. Dutch Elm disease is prevalent in the area and has killed most of the elm trees. Many of these dead trees have fallen into the channels. Lowland hardwoods occur in depressional areas and along existing channels. Mixed hardwood stands occur in the upland area where minor wetness precludes intensive agricultural use. The interspersation of forested land among crop and pasture lands produces desirable wildlife habitat. (11)

Thirty percent (1,344 acres) of the forest lands on this watershed are in "Fair" hydrologic condition. Forest land hydrologic condition is based on the amount of litter and humus produced. Forty percent (1,791 acres) of the forest lands on this watershed are in "Good" hydrologic condition. The remaining thirty percent (1,344 acres) of the forest lands on this watershed are in "Very Good" hydrologic condition. The hydrologic improvement potential is low on the forested lands with "Good" and "Very Good" hydrologic conditions. Improvement here is limited by slow natural drainage. On the forest lands with "Fair" hydrologic condition, hydrologic improvement potential is medium because droughty soils inhibit humus production. (11)

EXHIBIT 8

INDIAN CREEK WATERSHED
LAPEER, SANILAC AND TUSCOLA COUNTIES, MICHIGAN



SOURCE:
BASE INFORMATION FURNISHED
OVER A PERIOD OF 10 YEARS

Soil Conservation District cooperators with forest lands needing treatment are referred to the Michigan Department of Natural Resources (MDNR) forester who is based in Imlay City. Over the past ten years 18 forest land plans were prepared for forest land owners in this watershed. These were concerned with harvest cutting and general forest management. (11)

Plants most likely to occur on idle cropland, abandoned cropland, and along drainage and stream channels in the watershed are listed below.

PLANTS FOUND IN THE WATERSHED

<u>Grasses</u>	<u>Vines</u>	<u>Shrubs</u>
Bluegrass	Bitter Nightshade	Choiceberry
Bromegrass	Greenbriar	Dewberry
Quackgrass	Poison Ivy	Elderberry
Reed Canarygrass	Wild Grape	Gray Dogwood
Timothy		Hawthorn
		Juniper
		Pin Cherry
<u>Legumes</u>	<u>Weeds</u>	Red-osier Dogwood
Alfalfa	Chicory	Rubus Species
Red Clover	Daisy Fleabane	Shrub Willow
Sweet Clover	Goldenrod	Silky Dogwood
(white and yellow)	Lambsquarter	Sumac Species
White Dutch Clover	Milkweed	
	Mullen	
	Orange Hawkweed	
	Pigweed	
	Ragweed	
	Smartweed	
	Thistle Species	
	Wild Carrot	

Observations were made on the aquatic flora and fauna in November 1973. The time of year the observations were made prevents making an accurate analysis of the aquatic environment. The following aquatic invertebrates and plants were observed.

AQUATIC INVERTEBRATES AND PLANTS

Adams Drain at Marble Road-invertebrates:sphere-shelled clams, pouch snails, bloodworms

Aquatic plants: cattails, duckweed, filamentous green algae

McKillop Drain at Hathaway Road-invertebrates: sphere-shelled clams, pouch snails, bloodworms (high occurrence)

Aquatic plants: duckweed, cattails (extensive growth)

South Clifford Drain in Clifford-invertebrates: sphere-shelled clams, wheel-snails, pond snails

Aquatic plants: duckweed (extensive growth), cattails

Negus Drain at Lake Pleasant Road-invertebrates: sphere-shelled clams (high occurrence), wheel-snails, midges (Chironomidae), amphipods
Indian Creek at Clifford Road-invertebrates: wheel-snails (high occurrence), pouch-snails, pond snails, caddisflies (Limnophilidae)
 Aquatic plants: duckweed (extensive growth)
Indian Creek at Hathaway Road-invertebrates: caddisflies (Rhyacophilidae, Hydropsychidae, Limnophilidae), mayflies (Heptagenidae), water scavenger beetles, midges (Chironomidae)

Carp is the major fish species. There are no known fish collection records for the Indian Creek system. The common forage fish species found in southern Michigan inland waters that are listed in Fishes of the Great Lakes Region, C. Hubbs and K. Lagler, 1947, most likely occur in the Indian Creek system. Forage fish that have been observed are mudminnows, suckers, Chubs, and shiners. Fishery potential is considered low.

At present, the watershed offers only fair habitat for pheasants and rabbits and poor habitat for waterfowl, however, some mallards, woodducks and blue-winged teal nest in this area. Some use of the area is made by migrating teal, mallards, and black ducks. The watershed is located on the major flyway between Saginaw Bay and Lake Erie and offers good potential for the attraction of migrating waterfowl. (1)

The primary game species in the area are ring-necked pheasants, quail, woodcock, ruffed grouse, cottontail rabbits, fox and gray squirrels, raccoons, white-tailed deer, red fox, and muskrats. Numerical densities are not available on game species, but the Michigan Department of Natural Resources indicates that the pheasant population is down (may be temporary), and the deer numbers are up and increasing. A number of songbirds, doves, crows, hawks, and owls nest in the area. Skunk and opossum numbers appear to be up. Hunting success has been good for deer and average for other game species. There are no rare or endangered species in the watershed.

Economic Resources

There is no state or federally owned land in the Indian Creek Watershed. Except for the village of Clifford, which occupies approximately 960 acres, the watershed is predominantly agricultural.

Dairy is the major farming enterprise in the watershed. Other less important farming enterprises are cash grain, livestock production, and truck cropping. There are an estimated 135 farms in the watershed. Farm holdings average about 95 acres and range in size from 40 to 240 acres.

Approximately 62 percent (12,620 acres) of the watershed is in cropland and pasture, at the present time. The major crops are corn, wheat, oats, hay, and a small amount of soybeans. Dairying and hog production utilize some of the feed grain produced in the watershed. Yields for the principal crops grown, for the watershed as a whole and for the water resource problem areas, without the project, are as follows:

CROP YIELDS

<u>Crop</u>	Yield	
	<u>Watershed as a Whole</u>	<u>Flood Plain</u>
Corn Grain (bu)	81	75
Corn Silage (Ton)	12	10
Wheat (bu)	42	35
Oats (bu)	67	65
Hay (Ton)	2.5	2.5

There are 4,480 acres of forest land in the watershed. Good markets for sawlogs and fair markets for boltwood provide opportunities for commercial improvement of timber stands.

Land values vary with soil type, location, and improvement. Agricultural land that has been cleared and tilled and has adequate tile outlets is valued at \$220 per acre. Flood plain land is valued at \$120 per acre. Since Clifford is the only town or village in the watershed, no attempt was made to establish a value for urban land.

Access to the watershed is good to fair. The network of county roads is fair to very good. Michigan Highway 90 runs east and west just south of the watershed boundaries. Two railroads - the Chesapeake and Ohio, running east and west, and the Grand Trunk, running north and south - intersect within the village limits of Clifford.

All of the farms in the flood plain area are family farms. Approximately 50 percent of the farms in the watershed are operated by part-time farmers who have off-the-farm jobs. Since the major portion of the project area (approximately 97 percent) is located in Lapeer County, most of the following information concerning the general economic characteristics of the area is data for Lapeer County. Percent of total farms by economic class (1969) is listed in the following table.

PERCENT OF FARMS BY ECONOMIC CLASS (16)

<u>Economic Class</u>	<u>Percent of Farms</u>
Class 1 - Sales of \$40,000 and over	5.8
Class 2 - Sales of \$20,000 to \$39,999	12.3
Class 3 - Sales of \$10,000 to \$19,999	10.0
Class 4 - Sales of \$5,000 to \$9,999	9.5
Class 5 - Sales of \$2,500 to \$4,999	11.3
Class 6 <u>a/</u>	6.0
Part-Time <u>b/</u>	35.0
Part-Retirement <u>c/</u>	10.1

a/ "Class 6 Farms" have a value of farm products sold of \$59 to \$2,499 and a farm operator under 65 years of age who did not work off the farm 100 days or more.

b/ "Part-time Farms" have a value of farm products sold of \$50 to \$2,499 and a farm operator under 65 years of age who worked off the farm 100 days or more. (In addition approximately 15% of the farms are operated by part-time farmers having sales in excess of \$2,500.)

c/ "Part-retirement Farms" have a value of farm products sold of \$50 to \$2,499 and an operator 65 years old or over.

Average market value per farm (1969) of all agricultural products sold was \$12,161 for Lapeer County and \$10,641 for Michigan. In 1969, 5.8 percent of all farm operators in Lapeer County worked 100 to 199 days off the farm and 47.7 percent worked 200 days compared to 7.8 percent and 44.6 percent, respectively, for Michigan. (10) In 1964, 54.5 percent of all farm operators earned \$5,000 or more off-farm income and 46.6 percent of all farm families in Lapeer County had off-farm income exceeding their farm income. (16)

Statistical data is most readily available by county. A large part of the watershed and all of the problem area lies within Lapeer County. Social characteristics of Lapeer County are considered representative of the watershed. These characteristics are summarized as follows:

SOCIAL CHARACTERISTICS a/

<u>FACTOR</u>	<u>UNIT</u>	<u>LAPEER COUNTY</u>	<u>MICHIGAN</u>
<u>Population</u>			
1960	No.	41,926	7,823,194
1970	No.	52,317	8,879,862
Change 1960 to 1970	%	24.8	13.5
Rural 1960	No.	35,766	2,084,062
Rural 1970	No.	46,047	2,321,310
Rural change 1960 to 1970	%	28.7	11.4
Urban 1960	No.	6,160	5,739,132
Urban 1970	No.	6,270	6,553,733
Urban change 1960 to 1970	%	1.8	14.2
1990 <u>b/</u>	No.	77,523	12,226,000 <u>c/</u>
Change 1970 to 1990	%	48.2	37.7 <u>d/</u>
Density 1970	No./Sq.Mi.	79.5	156.2
Net migration 1960 to 1970	No.	4,554	27,236
Persons per household <u>e/</u>	No.	3.54	3.27
<u>Health</u>			
Physicians <u>f/</u>	No.	41	11,214
Dentists <u>f/</u>	No.	19	4,518
Nurses <u>f/</u>	No.	416	68,713
Hospitals	No.	1	248
Hospital beds	No.	166	40,587
Nursing homes	No.	2	458
Nursing home beds	No.	174	37,671

<u>FACTOR</u>	<u>UNIT</u>	<u>LAPEER COUNTY</u>	<u>MICHIGAN</u>
<u>Housing</u>			
Total units <u>e/</u>	No.	13,835	2,653,059
<u>Education</u>			
Enrollment <u>e/</u>	No.	15,573	2,770,179
Persons 25 & older completing High School <u>e/</u>			
male	%	49.6	51.2
female	%	54.1	54.2
<u>Employment</u>			
Nonworker-worker ratio <u>e/</u>	ratio	1.85 <u>h/</u>	1.52
Unemployment <u>g/</u>	%	6.3 <u>h/</u>	8.2
<u>Income</u>			
Medium family income <u>i/</u>	\$	5,282	-
\$15,000 and over <u>i/</u>	%	21.0	-
Below poverty level <u>i/</u>	%	8.3	-

a/ All data in the table is from the Michigan Statistical Abstract unless otherwise noted.

b/ Project 80 and 5, "Summary of Phase I Papers," Michigan State University, 1972.

c/ Project 80 and 5, projection for year 2000.

d/ Percent change from 1970 to 2000.

e/ 1970 information.

f/ 1972 information.

g/ 1971 information.

h/ This figure is for the Lapeer-Genesee County group.

i/ 1969 information.

During 1963, retail sales per capita were \$1,120, wholesale sales per capita were \$501, and value added by manufacturing per capita was \$514. (10) These were 84.5 percent, 27.7 percent, and 29.5 percent of the respective averages for Southern Michigan. There is no major industry in the watershed. Employment opportunities are found in retail, wholesale, and other industries in the nearby industrial centers. Much of this population increase is a result of rural migration from the industrial centers of Detroit and Flint, Michigan. By the year 2000, the suburbs of northern Detroit will approach the southern boundary of Lapeer County. In 1960, 24.7 percent of the population of Lapeer County was rural farm, 60.6 percent was rural non-farm, and 14.7 percent was urban. (10)

Recreational Resources

There are 18 ponds averaging one-half acre in size in the watershed which support approximately 235 angler days of fishing per year. They also receive substantial use for swimming purposes. The only lake in the area is small and privately owned. Public recreational facilities are non-existent in the watershed. Most of the recreational resource is represented by small and big game hunting on private property. Trapping is also significant. Pollution and water quality do not have an adverse effect on the use of recreational resources.

Archeological and Historical Resources

Contact has been made with the Michigan History Division, Michigan Department of State, and the area has been surveyed. Their findings indicate that there are no archeological, architectural or historic properties in the area. There are no known archeological, historical, scientific or unique scenic areas in the watershed as designated by the National Register of Historic Places or by any other qualified sources.

Soil, Water, and Plant Management Status

From 1964 to 1969 the acres of land in farms in Lapeer County decreased from 292,795 acres to 245,956 acres or 16 percent. This is a decrease from 69.6 percent to 58.4 percent of the total land area. Total cropland decreased by 16.3 percent and harvested cropland decreased by 27.9 percent. (16) From 1950 to 1960 the percent of the population that was classed as rural farm decreased by 14.4 percent and urban decreased by 2.4 percent, while rural non-farm increased by 16.8 percent. (10) This trend will most likely continue or accelerate through the 1970's and beyond, creating an increased land use demand for rural non-farm housing.

On the average, yields are lower per acre in the problem area than the watershed as a whole by 7 bu for wheat, 6 bu for corn grain, 2 bu for oats, and 2 tons for corn silage.

The soil conservation districts conduct information programs on the benefits of proper land treatment. They encourage landowners and operators to maintain land treatment measures for the protection and improvement of the watershed. Of the 135 landowners in the watershed, 80 or about 59 percent are cooperators with the soil conservation districts. There are 52

basic farm conservation plans. Approximately 12,220 acres or 60 percent of the watershed is covered by agreements. About 53 percent of the practices recommended in the basic plans have been applied. Over all about 50 percent of the cropland, 30 percent of the pasture, and 50 percent of other land is adequately treated. While only about 10 percent of the forest is adequately treated for optimum production, it has 100 percent adequate fire control and produces very little sediment.

LAND TREATMENT PRACTICES ALREADY APPLIED

MEASURES	UNIT	APPLIED TO DATE (April 1971)
Land Treatment		
District Cooperators	No.	80
Basic Farm Conservation Plan	No.	52
Conservation Cropping System	Acres	4,919
Crop Residue Use	Acres	3,432
Grade Stabilization Structure	No.	4
Grassed Waterways	Acres	12
Minimum Tillage	Acres	3,718
Drainage Main or Lateral	Feet	32,013
Pasture and Hayland Management	Acres	429
Pasture and Hayland Planting	Acres	54
Drainage Field Ditch	Feet	16,604
Tile Drain	Feet	1,103,487
Pond	No.	18
Fishpond Management	No.	3
Wildlife Upland Habitat Management	Acres	193
Tree Planting	Acres	200
Management Plans	Number/Acres	18/415
Hydrologic Cultural Operations	Acres	345
Fire Control	Acres	4,479

WATER AND RELATED LAND RESOURCE PROBLEMS

Land and Water Management

Land does not produce up to its full potential when plagued with flooding and inadequate drainage. Because of these conditions, it is sometimes impractical to follow recommended land management practices, and many farmers have been prevented from making the necessary investments in land treatment measures. Spring and fall floods and impaired drainage prohibit performing field operations in a timely manner. The high probability of flooding prohibits farmers from investing in proper cultural practices. These conditions cause decreased yield and inefficient use of land, labor, and capital. As a result, agricultural and commercial forest land are often put to a less intensive use than their potential capabilities.

Floodwater Damage

Floodwater damage and impaired drainage are the major land and water resource problems of the watershed. Due to a naturally high water table, drainage of excess water from flooding is often impaired and prolonged. Therefore, it is often difficult to distinguish between the effects due to flooding and effects due to impaired drainage. As a result, it is necessary to refer to flooding and impaired drainage together in this section and the section on drainage.

There are no towns or villages in the flood plain area. Damages are primarily to agricultural lands. Inadequate channel depth and capacity allow flooding and cause impaired drainage on approximately 2,225 acres of land, including 1,104 acres of cropland. This area requires improved drainage for efficient agricultural use and is dependent upon adequate channel depth for drainage outlets.

Agriculture is the primary land use in the problem area. Land use, including major crops, is as follows:

PROBLEM AREA LAND USE PATTERN

<u>Land Use</u>	<u>Present Acres</u>	<u>Present Percent</u>
Cropland		
Corn	421	19
Wheat	134	6
Oats	155	7
Hay	394	18
Pasture	121	6
Idle Cropland	498	22
Woods	318	14
Other	184	8
	2,225	100

There are approximately 29 farms in the problem area having an average size of 117 acres.

Most of the damages result from small flood events that occur two or three times, on the average, each year. Damage due to flooding and impaired drainage occurs primarily during the spring and results in inundation and delayed planting of crops. Excess soil moisture due to flooding and lack of adequate drainage outlets also occurs during the growing season and at harvest time. This condition depresses crop yields, increases cultivation and harvesting costs, and adversely affects the quality of crops. Agricultural land in the problem area is valued at \$120 per acre. Floodwater damage to agricultural improvements and other private and public property is relatively minor. Land in the problem area will for the most part remain in agriculture. This land will increase in value along with other agricultural land, but increases are expected to be minor due to relatively low demand for development property in this area.

The problem area was divided into two evaluation reaches, Indian Creek and Adams Drain. The Adams Drain reach was evaluated from the Clifford Road south to its confluence with Indian Creek. Agricultural production is slightly better in the Adams Drain area than in the Indian Creek area. The farms are slightly larger and more progressive with more intensive land treatment measures and cultural practices being applied. As a result, damages due to flooding and impaired drainage are also greater.

All of the evaluated damages result from floodwater. The estimated average annual floodwater damages to crops and pasture are \$550. Other agricultural and non-agricultural damages are not significant. Floods do not have a direct significant effect on the lives and health of the people in the watershed. In case of an emergency, road flooding could endanger the health or life of an individual needing medical care. Frequent spring floods sometimes block roads in the lower end of the watershed preventing milk haulers from making their pick-up on schedule. If milk cannot be picked up within the required time limit, farmers must dispose of their milk, thus, losing part of their income.

Erosion Damage

The overall gross erosion rate for the watershed is 1.4 tons/acre/year (28,660 tons total). (13) Sheet erosion on the 10,990 acres of cropland occurs at an average rate of 2.3 tons/acre/year (25,280 tons total). This is less than the allowable soil loss (the amount that can be lost and still maintain productive capacity of the soil) of 3 tons/acre/year for most soils in the watershed. The rate for 9,370 acres of forest land and other land is 0.35 tons/acre/year (3,280 tons total). Cattle tramping on the stream-bank causes erosion along 1,775 feet of channel. Erosion damages within the watershed consist of soil materials from cultivated land, roadside ditches, and small upland gullies. These damages are minor and within the allowable soil loss limits and do not produce a measurable amount of land voiding or off site damages.

Sediment Damage

Most of the sediment entering the channel system of Indian Creek is derived from sheet erosion, roads, and streambanks sloughing due to cattle tramping them. Some road ditches and banks are not naturally vegetated and are not seeded following maintenance. An example of this can be found along Jefferson Road near Marble Road. Sediment is also found in gravel road surface runoff. There are instances of farmers cultivating road ditches and within 10 feet of channel banks. Sediment leaving the watershed is calculated to be 2,860 tons per year. (13) The remaining 25,800 tons are relocated on different land areas in the 23,360 acre watershed or in stream channels. The overland deposition is too small to be measurable nor does streambed deposition create identifiable monetary damages.

Drainage Problems

Inadequate channel depth and capacity allow flooding and cause impaired drainage on approximately 2,225 acres of land, including 1,104 acres of cropland. Organic debris accumulations of three or more feet in South Clifford and McKillop Drains have significantly decreased channel capacities. Organic debris buildups in Adams and Negus Drains from 3 to 24 inches have reduced channel capacities. This area requires improved drainage for efficient agricultural use and is dependent upon adequate channel depth for drainage outlets. Excess soil moisture due to flooding and lack of adequate drainage outlets also occurs during the growing season and at harvest time. Slow natural drainage reduces forest productivity for marketable wood products. Access to forest land for harvesting is also inhibited by slow drainage. Because of flooding and impaired drainage, it is often not possible to follow recommended crop rotations and cultural practices, and has prevented many farmers from making necessary investments in land treatment measures. These conditions result in a lower quality product; less intensive land use; reduced yields; and inefficient use of land, labor, and capital.

The problem area consists of both organic and mineral soils. In most cases, these soils are poorly drained with high or seasonal high water tables, moderate to wide crop adaptability, and pose severe limitations to crop production if not drained. These soils are highly productive if they are flood-free and adequately drained.

Recreation Problems

Indian Creek and its tributaries are shallow and base flows are inadequate to support a sport fishery.

Public recreational facilities are non-existent in the watershed. The only lake and all ponds are privately owned. Public access to wildlife resources is restricted to permission from private owners.

The projected population for Lapeer County in 1990 is 77,523, a 48.1 percent increase over 1970. This entire portion of Southern Michigan is expected to have a sustained population growth. The watershed is within one hour's drive of the cities of Flint and Saginaw. These trends indicate

a high potential demand for recreation in the area. Since there are presently no public recreational facilities in the watershed, there is a definite need for additional recreational facilities, particularly water based recreation.

Plant and Animal Resource Problems

Flooding and poor drainage of cropland have resulted in fall plowing which eliminates the crop residue and invertebrate food source for wildlife. Flooding of wildlife nesting, denning, and cover areas adjacent to cropland occurs during a one year flood. The watershed and surrounding area have a small total amount of water area and are located in a major waterfowl flyway. There is a need for additional water acreage to provide for waterfowl nesting areas and migration resting areas.

Sediment has filled in pools and riffles used by small fish and has produced a less desirable channel bottom (sand, silt, and organic debris) in all channels for the production of aquatic food species used by fish, aquatic and semi-aquatic birds and mammals. Sediment in suspension causes turbid water during heavy rain and runoff. Turbid water inhibits light penetration, thus hindering the growth and production of desirable aquatic plants.

Excessive growth of duckweed and cattails occur on McKillop, South Clifford and Adams Drains. Abundant filamentous green algae occurs in Adams Drain.

Water Quality Problems

No detailed chemical or bacteriological information is available on the waters of Indian Creek or its tributaries. Shallow stagnant water and large amounts of organic sludge in the tributaries are indicative of low dissolved oxygen concentrations. Frequent occurrences of bloodworms, midge larvae, sphere-shell clams, pouch snails, pond snails, and wheel-snails in the tributaries indicate the presence of low oxygen, concentrations of excessive nutrients and slow water flow. Large duck-weed blooms on McKillop and South Clifford Drain indicate the waters are nutrient enriched. All sources of nutrients are not known, but nutrients support plant matter which is decaying within the channel and is a problem.

Economic-Social Problems

It is estimated that approximately 50 percent of the family farms in the problem area are low income producing units and that as many as 60 to 70 percent of the farm operators work off the farm. Almost all of the farms in the problem area are family farms with very few employing 1 1/2 or more man-years of hired labor.

Although unemployment is about average for that region, underemployment is evident for both the non-farm sector and the farm operators working off the farm. Although there are many low income families, incidence of poverty is generally restricted to the aged. There is a higher than normal percentage of homes in Clifford that are deteriorated or are in need of paint and repairs. Several businesses have closed, leaving their buildings vacant. Clifford is unable to generate enough tax revenue to provide many badly needed public services.

RELATIONSHIP TO LAND USE PLANS, POLICIES,
AND CONTROLS

Concerned Federal and State agencies were given notification of the purpose and scope of the project during the planning process. No conflicts in land use plans, policies, or controls were identified.

In the Lapeer County "Comprehensive Development Plan for 1990" there are no planned land use changes for the watershed area. There are no known conflicts between existing land use plans, policies, or controls and the project as planned.

ENVIRONMENTAL IMPACTS

Conservation Land Treatment

Land treatment practices will reduce the gross sheet erosion rate from 1.4 tons/acre/year to .97 tons/acre/year. Sheet erosion from cropland will be reduced from 2.3 tons/acre/year to 1.5 tons/acre/year. Sediment leaving the watershed will be reduced by 31 percent, from 2,860 tons per year to 1,980 tons per year. Runoff will be reduced by 2-4 percent.

Minimum tillage practices will reduce the number of times a farmer must pass over a field, thereby reducing fossil fuel consumption by an estimated 7,200 gallons annually. Crop residues left on fields will provide wildlife food and cover. Drainage practices will improve agricultural efficiency. Other practices such as tree or shrub plantings will help provide vegetative cover to supplement forest resources.

The proposed forest land treatment measures will help maintain and improve the hydrologic condition of the forest land. Continued good management will increase the productivity of desired goods and services on forest lands. Increased productivity will result on 301 acres of forest land. These measures will also enhance forest land suitability for managed areas which may contribute to the beautification and aesthetic appeal of the watershed.

Forestation of appropriate open land is necessary to adjust land use to capability and to provide a permanent vegetative cover. The additional litter and humus produced will improve infiltration and increase water storage capacity in the upland soils. On the edges of low, poorly drained forest lands, special tree and shrub plantings will reduce soil moisture, improve productivity, increase soil moisture storage capacity and help protect soil from erosion. Special tree and shrub plantings would also provide habitat for wildlife.

Structural Measures

Construction will cause the consumption of nonrenewable fossil fuels such as gasoline, diesel fuel and motor oil.

Installation of the planned multiple-purpose channel work will reduce damaging floods from an annual occurrence to an average of once in three years. Channel work will also provide an adequate internal soil drainage outlet for the problem area. Flood water damage is mainly restricted to annual flooding of agricultural land rather than from large infrequent floods. Area flooded in acres by storm frequency, without and with project, is displayed in the following table:

ACRES FLOODED

<u>Flood Frequency</u>	<u>Without Project</u>	<u>With Project</u>
100 year	570	416
50 year	510	363
25 year	433	290
10 year	328	227
5 year	261	130
3 year	195	72 _a /
2 year	125	34 _a /
1 year	84	23 _a /
Average Annual	183	87

a/ These acres are isolated low areas of non-cropland.

When floods occur, damage due to flooding with the project will be less, since with improved drainage, floodwater will recede much quicker.

Because of the locations of channel work and a resulting change in peak travel time, the peak discharge will not change significantly below Millington Road. The flood peak from Upper Indian Creek will have passed Negus Drain before the peak from Negus Drain reaches its outlet. Also, the peak flow on Adams Drain will have passed before the flood peak of Indian Creek has arrived at Adams Drain. The timing of these peaks has the effect of lowering the peak flows at Millington Road and on downstream to the confluence of Indian Creek and the North Branch of the Flint River. Peak discharges at Millington Road (without project and with project) for various frequency storms are listed in the following table:

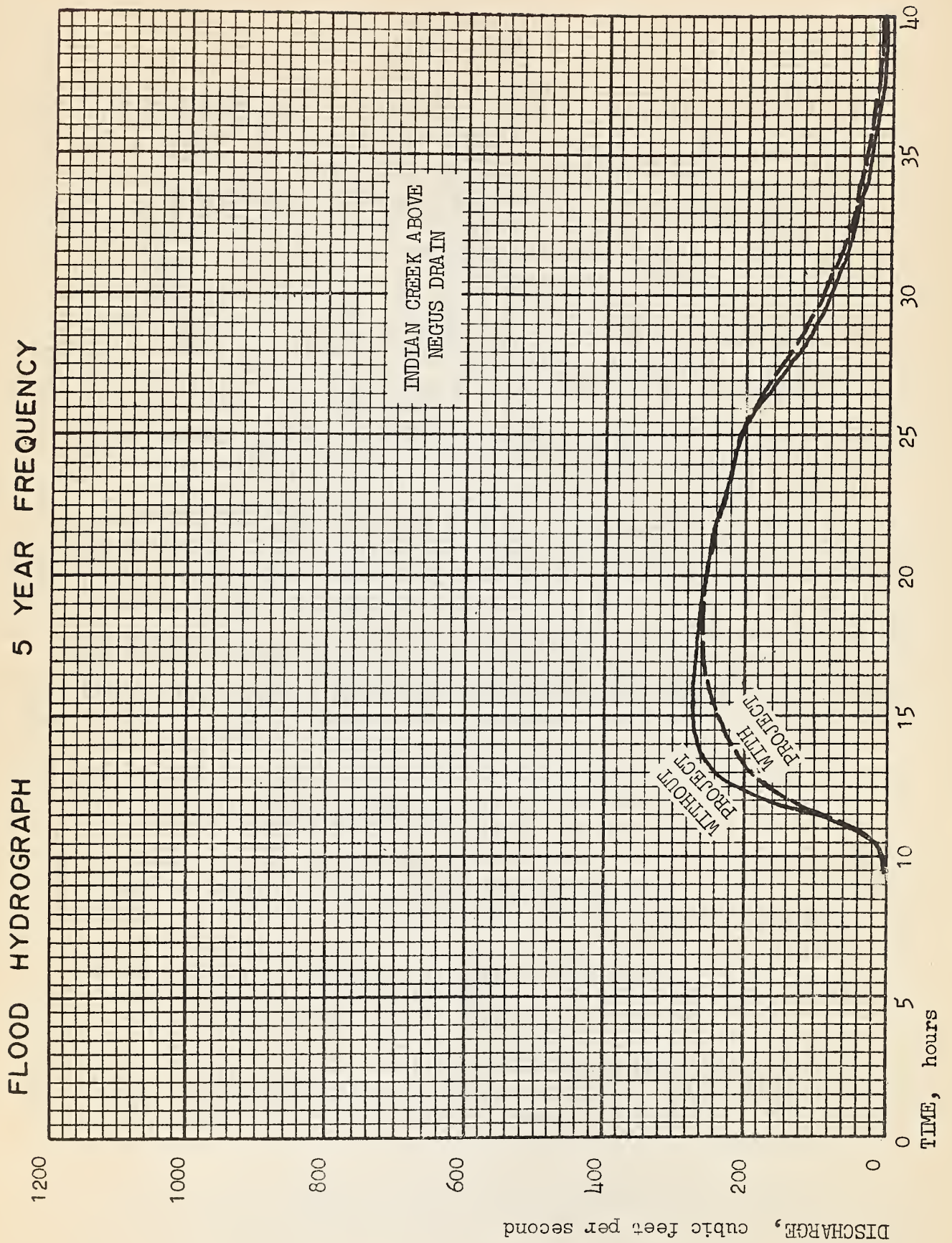
FREQUENCY-PEAK DISCHARGE

<u>Location</u>	<u>Peak Discharge CFS</u>				
	<u>Frequency of Storm</u>				
	<u>1 yr.</u>	<u>2 yr.</u>	<u>3 yr.</u>	<u>5 yr.</u>	<u>50 yr.</u>
Millington Road					
Without Project	407	545	770	1,072	2,214
With Project	385	508	720	990	2,081

Selected flood hydrographs for a 5 year frequency event for both without project and with project conditions are shown on following pages. These hydrographs show that volumes of runoff are not changed due to channel work and that peak discharges are reduced.

Structural measures will reduce flooding and improve drainage to a total of 2,225 acres, including 1,324 acres of cropland. A total of 29 landowners will be affected directly. Most of these landowners are farm operators and depend upon the production of agricultural products as their

EXHIBIT 9



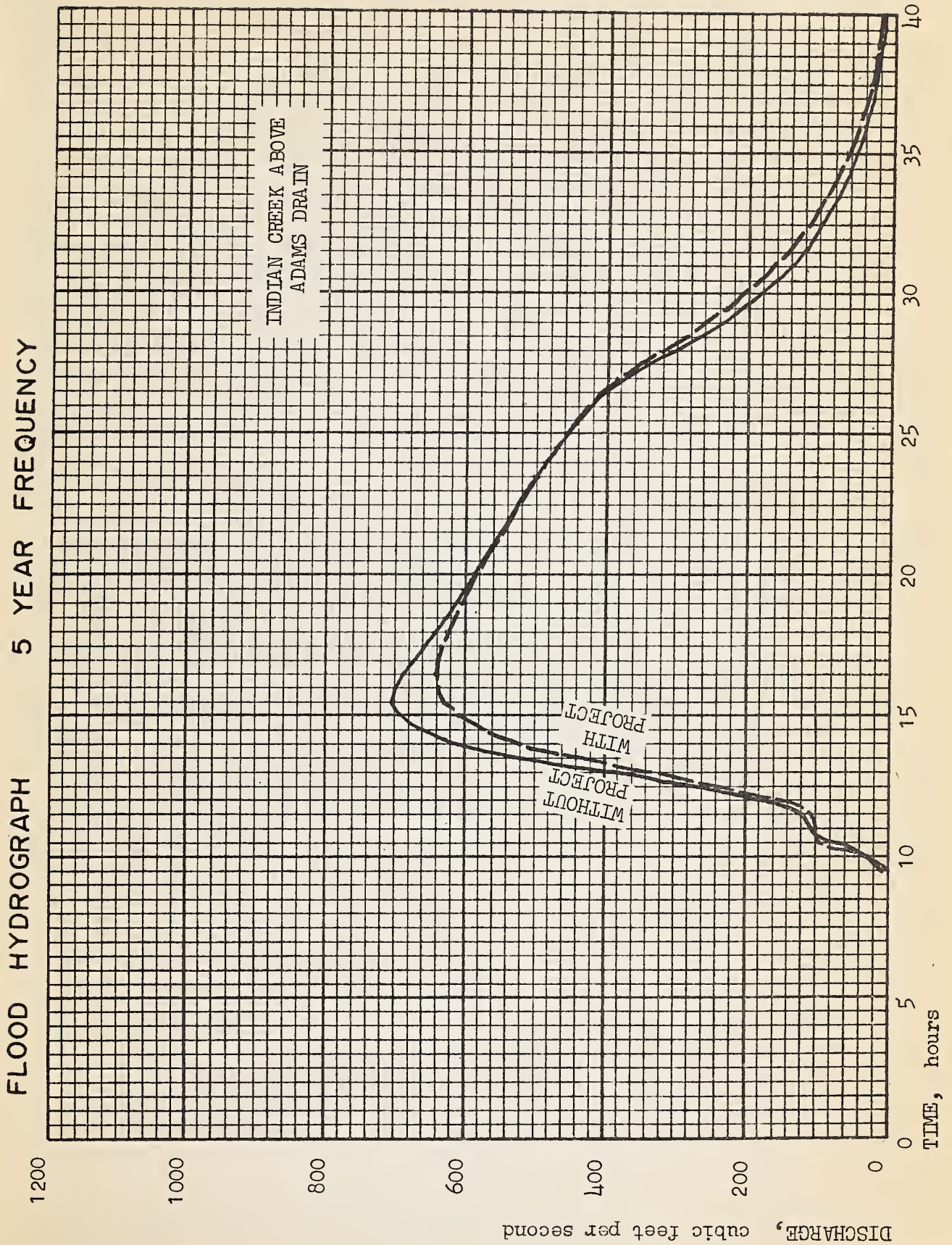
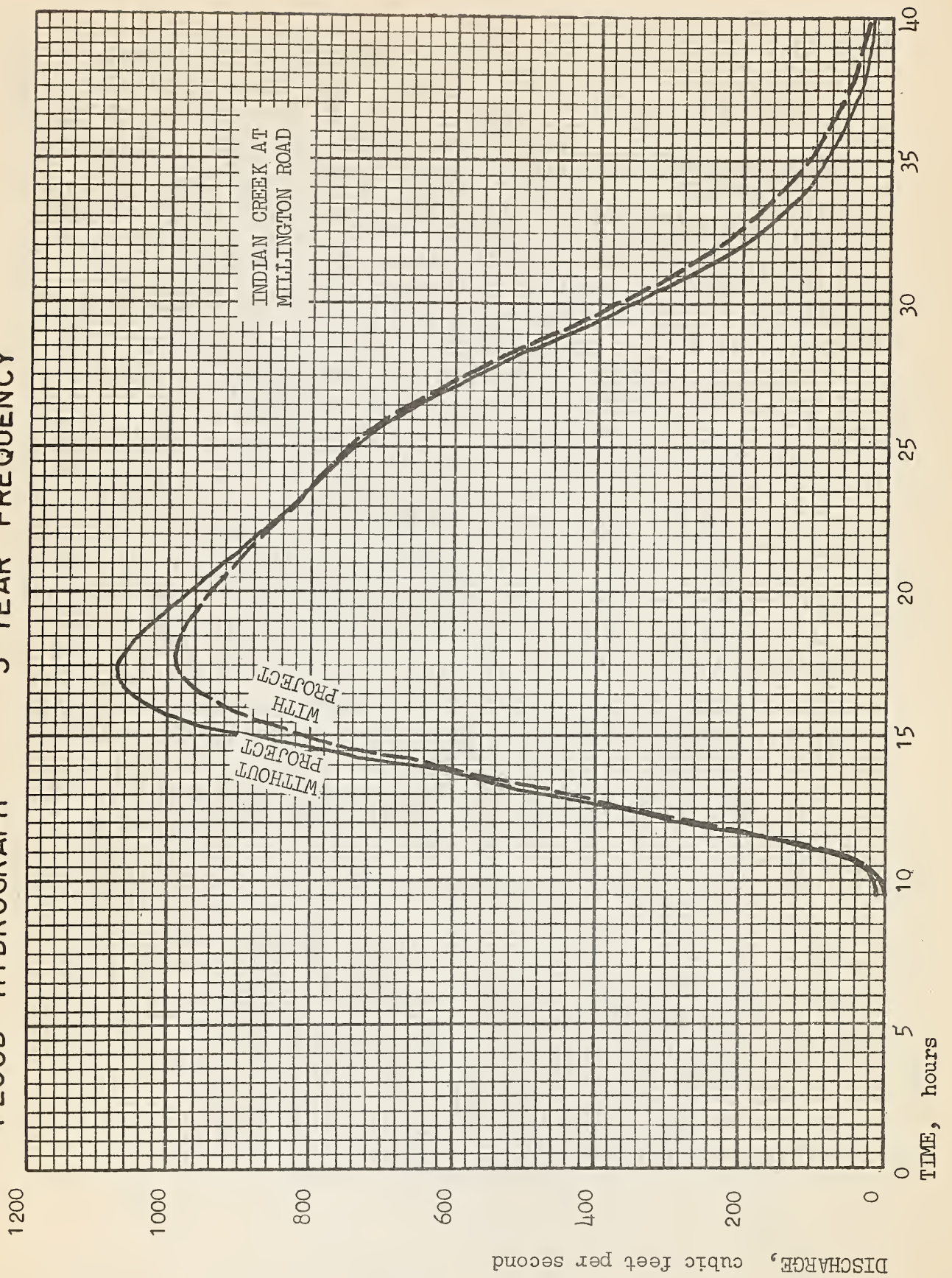


EXHIBIT 11

FLOOD HYDROGRAPH 5 YEAR FREQUENCY



primary source of income. There will be an estimated 60 percent decrease in average annual flood damage to agricultural land.

Land use in the problem area with and without project, including major crops, is as follows:

PROBLEM AREA LAND USE

<u>Land Use</u>	<u>Acres Without Project</u>	<u>Percent Without Project</u>	<u>Acres With Project</u>	<u>Percent With Project</u>
Corn	421	18.9	559	25.2
Wheat	134	6.1	163	7.4
Oats	155	6.9	153	6.8
Hay	394	17.7	449	20.2
Pasture	121	5.4	121	5.4
Idle Cropland	498	22.4	278	12.4
Woods	318	14.3	301	13.5
Other	<u>184</u>	<u>8.3</u>	<u>201</u>	<u>9.1</u>
TOTAL	2,225	100	2,225	100

Changed land use will occur on 220 acres of idle land. No land presently in forest land or pasture will be converted to cropland. The 220 acres of idle land will be changed in use to 136 acres of corn, 29 acres of wheat, and 55 acres of hay. More intensive land use will occur on 1,324 acres of cropland. This results from reduced production costs, improved crop quality, and increased production. Improved drainage will allow farmers to get into their fields earlier in the spring; will help prevent delayed harvesting of crops; will permit the selection of higher yielding full season crop varieties; and will allow a more effective weed control program.

The project emphasizes more intensive land use on agricultural land already in the production of crops. Increased production and lower production costs will help increase income on low-income family farms in the problem area.

Future expected crop yields with and without the project are as follows:

FUTURE CROP YIELDS

<u>Crop</u>	<u>Future Yield Without Project</u>	<u>Future Yield With Project</u>
Corn Silage (ton)	11.0	18.0
Corn Grain (bu)	90.0	125.0
Wheat (bu)	40.0	67.0
Oats (bu)	75.0	105.0
Hay (ton)	3.2	5.5
Pasture (CPD)	91.0	120.0

Deepening and widening of 1.9 miles of previously modified Adams Drain and .9 miles of Indian Creek will remove bottom substrate and cause sedimentation and turbidity which will lower the densities of aquatic and semi-aquatic species of plants, invertebrates and vertebrates for 5-10 years. Reestablishing aquatic species of plants, invertebrates and vertebrates, will benefit on a long-term basis by the reduction of sediment, reduction of livestock waste pollution, and the removal of oxygen demanding organic sludge from the channel. Fencing cattle away from the channel will provide a 90 percent reduction of streambank erosion, sedimentation and animal waste pollution along 1,775 feet of stream channel. Fences will keep cattle on the pasture side of the spoil, thereby, reducing direct runoff of water containing animal wastes. Increased amounts of pesticides and fertilizers will be applied on 1,324 acres. A rock drop structure near Clifford Road will help oxygenate the water.

The 20 foot vegetated portion of the right of way next to the channel will provide buffer strips along Adams Drain and Indian Creek which will trap sediment from surface runoff and provide wildlife habitat. Loss of wildlife habitat on 2.8 miles of channel banks, berms and spoil areas will exist for 1-3 years.

Channel work will lower the flood hazard to wildlife cover and nesting and denning wildlife in the vicinity of the channels. Piles of logs and brush along 4.9 miles of channel will provide temporary wildlife cover. Noise pollution and activity in the construction area will cause wildlife to be displaced during the construction period (3 months).

An evaluation of wildlife habitat in the channel right-of-way based on SCS criteria was made with the following results. (See Appendix C.) There is a total of 63.6 acres involved. Presently there is 24.5 acres of grassland with a habitat value of 14.8 acres; 22.0 acres of cropland with a habitat value of 6.7 acres; and 17.1 acres of woodland with a habitat value of 10.4 acres. Total present wildlife habitat value in the 63.6 acres of channel right-of-way is calculated to be 31.9 acres. As a result of the project, the 63.6 acres will all be converted to grassland with a projected habitat value of 50.8 acres. A value increase equivalent to 18.9 acres of wildlife habitat will result in the channel right-of-way. Although 220 acres of grassland habitat on 10 farms will be converted to cropland, the resulting wildlife habitat loss in the problem area will be offset by land treatment which provides food and cover.

Economic-Social

Structural measures will provide flood protection and improved drainage on a total of 2,225 acres. A total 29 landowners will be affected directly. Many of these landowners depend upon the production of agricultural products as their primary source of income. Farm income

will increase due to increased production, increased efficiency, improved crop quality, and more intensive land use. The project will also encourage and enable farm operators to use better management techniques. These factors will lessen farm operators' dependence on off the farm employment and will increase the ability of family farms to stay in business.

Local secondary benefits will total \$2,990 annually. Local secondary benefits will accrue to processors, handlers, and suppliers of goods and services. These are entirely of a local nature and will accrue within the immediate zone of project influences.

Average annual income in the area of project influence will be increased by \$27,300, the amount of total annual primary benefits. This increased income will accrue to farm operators in the problem area. Since the watershed area is small and Clifford has a limited capacity to supply goods and services, there will be little multiplier effect within the hydrologic boundary. The increased expenditure to agricultural goods and services within the area will be relatively small, as witnessed by only \$2,990 in local secondary benefits. It can also be expected that the increased expenditure for consumer goods and services within the watershed area will also be small. This means that the major effect on the local economy will be limited mainly to the initial impact of the \$27,300 primary average annual benefits. The increase in the local tax base would also be small, being almost entirely dependent on the portion of the \$27,300 annual benefits that would be channeled into real estate improvement and any increase in land value that may subsequently result in increased real estate revenues. The project will improve the quality of living of those farm families in the problem area, many of which are low income, by increased income accruing from the \$27,300 average annual benefits.

There are no known surface or subsurface mineral resources in the area nor is there any expected impact from the project on any possible future mineral production.

Although Lapeer County has a relatively high projected growth, 48 percent increase between 1970 and 1990, urban and rural nonfarm housing expansion is not expected to have a significant impact on the watershed area because this is about the same growth rate experienced for the period of 1960-1970. Nonetheless, forest stands should be protected for eventual use as recreation parks and greenbelts. Appendix F summarizes annual project costs, benefits, and benefit cost ratios.

FAVORABLE ENVIRONMENTAL EFFECTS

- a. Reduce gross sheet erosion rate from 1.4 tons/acre/year to .97 tons/acre/year.
- b. Reduce sheet erosion on cropland from 2.3 tons/acre/year to 1.5 tons/acre/year.
- c. Reduce sediment leaving watershed by 31 percent (880 tons) annually.
- d. Reduce surface water runoff by 2-4 percent.
- e. Reduce fossil fuel consumption by an estimate 7,200 gallons annually.
- f. Provide wildlife food and cover from crop residues left on fields.
- g. Increase productivity on 301 acres of forest land.
- h. Reduce agricultural flood damages to 29 landowners by 60 percent and

- reduce average annual acres flooded by 96 acres.
- i. Increase agricultural efficiency on 1,324 acres of cropland.
- j. Increase dissolved oxygen content of water by removing the oxygen demanding organic sludge from 1.9 miles of Adams Drain.
- k. Reduce sediment and animal waste pollution on Indian Creek by fencing cattle away from 1,775 feet of channel.
- l. Reduce flood hazard to nesting, denning, and cover areas for wildlife in the vicinity of the channels.
- m. Provide temporary wildlife cover in brush piles along channel.
- n. Increase the wildlife habitat value in the channel rights-of-way by a value equivalent to 18.9 acres.

ADVERSE ENVIRONMENTAL EFFECTS

- a. Loss of fossil fuels used in construction machinery.
- b. Erosion and sediment will increase on 1.9 miles of Adams Drain and .9 miles of Indian Creek during the construction period (3 months) and period of revegetation (1-3 years).
- c. Conversion of 220 acres of grassland - brushland wildlife habitat to cropland, a lesser value wildlife habitat.
- d. Lower densities of aquatic and semi-aquatic species of plants, vertebrates and invertebrates will occur for (5-10) years in 2.8 miles of previously modified stream channel.
- e. Loss of vegetative cover for wildlife along 2.8 miles of channel for up to three years.
- f. Noise pollution and activity in the construction area will cause wildlife to be displaced during the construction period (three months).
- g. Change 17.1 acres of forest land to grassland.

ALTERNATIVES

Accelerated Conservation Land Treatment Only

One alternative to reduce water and related land resource problems is accelerated installation of conservation land treatment measures. Such measures as conservation cropping systems, pasture and hayland management, tree planting and related conservation practices would be applied. Most of these practices would be applied on upland. Since there would be an inadequate drainage outlet without the project structural measures, it would not be economically feasible to install land treatment measures pertaining to drainage on 1,324 acres of cropland in the problem area. Accelerated land treatment measures would provide essentially the same reduction in runoff and sheet erosion on the uplands as the planned project, but this would only reduce floodwater and downstream sediment damages by three and seven percent, respectively. Ninety seven percent of the floodwater damages and ninety three percent of the sediment damages would remain. Flooding and impaired drainage would remain on 2,225 acres belonging to 29 landowners. This will result in continued reduced production and efficiency on crop and forest land. Water quality and wildlife habitat will improve as a result

of measures applied to land having no existing flooding or drainage problems. Land use in the problem area would change to more woods, pasture, and idle cropland. Depth of oxygen demanding organic material would continue to increase in Adams Drain; thus decreasing channel capacity and degrading water quality. This alternative would cost an estimated \$161,000.

Acquisition of Problem Area Properties for a Preserve

This alternative would eliminate all adverse effects of the proposed project on fish and wildlife habitat. Wildlife cover would increase by the conversion of 1,104 acres of cropland to grassland and eventually brushland. Depths of oxygen demanding organic material would continue to increase in Adams Drain. Food production would be lost from 1,104 acres. This alternative would adversely effect the economy of the area. Approximately \$80,000 from the production of crops would be lost annually. About 2,490 acres would need to be purchased (this includes purchase of entire tracts where partial taking would create an uneconomic farm unit). Tax base would be lost on these acres. Eleven farm families and three non-farm families would need to be relocated. Approximate cost of this alternative would be \$814,000.

Accelerated Conservation Land Treatment and 16.1 Miles of Channel Work

This alternative was investigated in detail as a means of meeting the sponsors full objectives for improved agricultural water management. To reduce the problems of flooding and impaired drainage on 3,300 acres, it has been determined that approximately 16.1 miles of multiple purpose channel work (flood prevention and improved drainage) would be needed. This includes 2.9 miles on Upper Indian Creek, 8.1 miles on Indian Creek, 3.5 miles on Adams Drain, and 1.6 miles on Negus Drain. The channel would have the capacity for a 3 year level of flood protection and depth to permit adequate drainage of the problem area. The conservation land treatment program would be essentially the same as in the proposed plan.

Deepening and widening of Indian Creek would harm 11.0 miles of aquatic habitat. Indian Creek was previously modified, but many undercut banks and pools have formed and now provide forage fish and desirable invertebrate production. Deepening and widening a total of 5.1 miles of Adams and Negus Drains would improve water quality and channel capacity by removing deep accumulations of oxygen demanding organic material. Forest land losses would be 35 acres.

The total estimated cost of this alternative is \$1,100,000. This includes \$332,100 for accelerated land treatment and \$767,900 for channel work. Average annual costs for channel work are estimated to be \$45,400. Average annual benefits are estimated to be \$31,800.

No Project

This alternative would result in the continuation of flooding and impaired drainage conditions and the subsequent loss of agricultural production in the problem area. Channels would continue to loose capacity at the present accelerated rate due to sediment and organic material deposition. More woody debris will accumulate in the channels. Erosion and sedimentation would continue at present levels. Cropland in the problem area will continue to change to permanent pasture, brushland, and forest land and, eventually, agricultural production will be lost. Flooding and poor drainage of county roads will increase. Annual flooding of nesting, denning and cover areas for wildlife will continue. Farmers in the problem area will have to depend on more off-farm income.

This alternative would allow channel bank vegetation to grow larger. The ongoing land treatment program would provide some increased wildlife food and cover. Fertilizer and pesticide use would be lower with no project due to decreasing agricultural production.

Net annual monetary benefits foregone by not implementing the project would amount to \$13,040.

SHORT-TERM VS. LONG-TERM USE OF RESOURCES

Present land use in the watershed includes 54 percent cropland, 8 percent pasture land, 22 percent forest land, and 16 percent other land uses. Agriculture, with 62 percent of the total land area, is the predominant land use. There is evidence of fairly rapid population growth in Lapeer County (which contains a major portion of the watershed). The population of Lapeer County increased 24.8 percent between 1960 and 1970 and is projected to increase 48.1 percent between 1970 and 1990. The portion of the total population that is classified rural nonfarm is increasing rapidly. The watershed itself is not sharing in this growth. The demand for land for residential use in the watershed is not expected to increase markedly until after 1980. Land in the watershed for the most part will stay in agriculture for some time in the future.

The main purpose of this project is to improve the efficiency of use and to maintain the productivity of agricultural lands in the watershed. Production efficiency of these lands will be increased for both present and foreseeable future.

In the short term construction period (three months) there will be an increase in stream turbidity and noise pollution. Lower densities of aquatic and semi-aquatic species of plants, invertebrates, and vertebrates will occur as a result of deepening and widening 2.8 miles of ephemeral previously modified stream channel. The lower densities will exist for 5-10 years. A loss of vegetative cover for wildlife and erosion control on channel banks, berms, and spoils will exist for up to three years on 2.8 miles of channel.

In the long term (50 years) terrestrial and aquatic animal production will increase as a result of project land treatment measures such as ponds, fish pond management, wildlife habitat management and wildlife habitat improvement.

Flood prevention and drainage improvements are long-term considerations. Agricultural improvements as a result of the project may make it more difficult to change to other long-term use options but does not preclude these options. Since agriculture will be the predominant land use in the future, the project is compatible with projected long-term use of the land. The aesthetic quality and recreational potential will also improve.

Installation of conservation practices together with flood prevention and drainage improvements will be effective in conserving land and water resources beyond the designed project life.

Indian Creek Watershed is in the Saginaw River Basin which is in the Lake Huron Subbasin of the Great Lakes Water Resource Region. The following PL-566 projects are also located in the basin. Their main objective is to protect and enhance existing agricultural land through flood prevention and drainage.

Projects Completed

1. Farm Creek-Lee Drain - 2.5 miles of channel work

Projects in Operation

1. Cass River (Middle Branch) - 12.4 miles of channel work
2. Cass River (South Branch) - 27.0 miles of channel work
3. Jo Drain - 10.4 miles of channel work
4. Misteguay Creek - 31.2 miles of channel work, 3 floodwater retarding structures

Projects Being Planned

1. State Road Drain - 14.0 miles of channel work (planning suspended, February, 1973)
2. Indian Creek - 7.7 miles of channel work

There are no cumulatively significant impacts on the environment from the proposed project action.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Channel work in the Indian Creek Watershed will irretrievably commit 22 acres of cropland and 17 acres of forest land to the channel right-of-way. The project will commit 63.6 acres of land along the channel to grassland wildlife habitat. Nonrenewable fossil fuels will be consumed during construction.

CONSULTATION AND REVIEW WITH APPROPRIATE AGENCIES AND OTHERS

GENERAL

General studies for the development of a Preliminary Investigations Report were begun by the Soil Conservation Service Watershed Planning Staff in 1969. Since that time, a number of meetings were held for obtaining information, planning, coordination and consultation. These meetings were held with interested individuals; federal, state, and local agencies; and the project sponsors.

A joint field review and three fish and wildlife planning coordination meetings were held between August 1969 and October 1971 with the Soil Conservation Service, Michigan Department of Natural Resources, and the Bureau of Sport Fisheries and Wildlife.

A public hearing was held in August 1970 to consider the necessity of the petition to improve the Indian Creek Drain. This Hearing of Necessity is required under the Michigan Drain Code. The preliminary report for the proposed watershed work was presented and questions discussed. Present at this meeting were: Lapeer County, Sanilac County and Tuscola County Drain Commissioners; Deputy Director for Inter-county Drains, Michigan Department of Agriculture; and 35 landowners.

Four meetings were held with the sponsors between June 1970 and March 1973. Generally present at these meetings were Lapeer, Sanilac, and Tuscola County Drain Commissioners; Lapeer, Sanilac, and Tuscola Soil Conservation District Representatives; Deputy Director for Inter-county Drains, Michigan Department of Agriculture; Clifford Village Clerk; and interested landowners.

A public meeting was held in Clifford January 14, 1974 to review, answer questions and receive comments on the preliminary draft Environmental Impact Statement for Indian Creek. Environmental, conservation, and governmental groups were notified of the meeting by mail. They were invited to review the Environmental Impact Statement available at four public locations and to submit written comments.

The following is a list of agencies and other sources from which written comments on the draft Environmental Impact Statement were requested and they responded as follows:

Department of Army	Responded
Department of Commerce	No Response
Department of Health, Education, and Welfare	Responded
Department of the Interior	Responded
Department of Transportation	Responded
Environmental Protection Agency	Responded
Advisory Council on Historic Preservation	Responded

Federal Power Commission
Great Lake Basin Commission
Governor of Michigan

Responded
Responded
Response by Michigan
Department of Natural
Resources
No response

State Clearinghouse

Discussion and Disposition of Each Comment on Draft Environmental Impact Statement

U.S. DEPARTMENT OF THE ARMY

1. Comment: "It is noted that the interest rate used for amortizing installation costs and discounting future benefits was 6-7/8 percent. Recent Water Resource Council guidelines provide for an interest rate of 5-5/8 percent."

Response: This comment relates to the Watershed Work Plan. No discussion of amortization rates is included in the Environmental Impact Statement. The Watershed Work Plan contains an addendum showing costs, benefits and B/C ratio computed at 5-7/8 percent interest.

U.S. DEPARTMENT OF THE INTERIOR

WORK PLAN

1. Comment: "Page 18, Plant and Animal Resource Problems, Paragraph 1-- Flooding of nests, denning, and cover areas for wildlife does occur near the channel area; however, flooding is a natural phenomenon and riparian wildlife populations normally do not suffer, over the long term, from seasonal flooding."

Response: This point is the subject of controversy between those who have made studies of this kind. The following is submitted:

Cottontail rabbits were scarce on the upland during winter because they migrated to the nearby lowland coverts. Many of the marked rabbits, however, reappeared on the upland in February and March. Where artificial burrows and brush piles were available along with moderately good tree and brush pile cover, the rabbits remained on the upland in greater numbers than in similar areas lacking this artificial cover. Consequently, the addition of holes or brush piles reduced the concentration in the lowland coverts. Such concentrations ordinarily increase the vulnerability of rabbits to predation and to mortality by flooding. Considerable mortality by drowning of *sylvilagus aquaticus littoralis* was found in Louisiana by Svihla (1929). Disease and parasitism, as well as vulnerability to predation are usually increased in importance among heavy concentrations of animals. Management measures

U.S. DEPARTMENT OF THE INTERIOR (continued)

which keep the rabbits dispersed on the upland should therefore be desirable - Management Studies of the Cotton-tail Rabbit in Southwestern Michigan, Arnold O. Haugen, Journal of Wildlife Management, Vol. 7, No. 1, January, 1943.

It is our contention that if there are short-term beneficial effects, then there are also long-term beneficial effects.

2. Comment: "Page 23, Land Treatment, Paragraphs 3, 4, and 6--The paragraphs should define the extent to which each of the practices will be used such as outlined in respect to forest land (paragraph 5, page 23)."

Response: Practices listed in paragraphs 3, 4, and 6 are typical practices used in conservation land treatment and are those thought to be needed and useful in this watershed. Various practices or combinations of practices can be used to adequately treat and protect resources. Cooperating farmers, working through their Soil Conservation Districts may freely elect to implement any practice or combination of practices. The kind and extent of land treatment practices to be installed have been estimated. These data are available in the back-up supporting data. Total acres expected to be adequately treated, can be projected with reasonable accuracy. Since acres adequately treated is the goal rather than units of a particular practice, this approach is appropriate and desirable.

3. Comment: "Page 45, Structural Measures, Paragraph 3--In respect to the thought that channelization will lower the flood hazard to wildlife, please refer to our previous comment on Plant and Animal Resource Problems. It should be noted too, that the brush piles which will be placed along 4.9 miles of channel will offer only temporary cover for wildlife."

Response: In addition to the response to comment number 1 above, it should be noted that the work plan on page 45, paragraph 3 indicates the brush piles will provide only temporary cover.

4. Comment: "We do not agree that construction activity will result in a temporary relocation of wildlife as implied in this paragraph. This could only be realized if wildlife populations in the adjacent areas were well below the ecological carrying capacity for the species involved."

U.S. DEPARTMENT OF THE INTERIOR (continued)

Response: Page 45, paragraph 3 states that "Noise pollution and activity in the construction area will cause wildlife to be displaced during the construction period." There is no intent to imply that this is a temporary relocation. There will be an increase in wildlife habitat value in the channel right-of-way. It is true that because of modification of habitat in the channel right-of-way some species may not re-establish, or may re-establish in lesser numbers than before construction. However, other species suited to the new habitat will be established and the expected net result is an overall increase in habitat value.

5. Comment: "Page 45, Structural Measures, Paragraph 4--This paragraph indicates an increase of wildlife habitat in the channel right-of-way. We question whether the resulting increase in wildlife habitat will support as much wildlife and the diversity of wildlife that presently exist in the channel right-of-way."

Response: Page 45, Paragraph 4, is pointing out the changes and increases for wildlife habitat. No claim is made regarding numbers or diversity, however, with an increase in habitat it is reasonably expected that increased numbers of wildlife will use this area.

6. Comment: "Page 68, Fish and Wildlife Investigations, Paragraph 5--The word "negligible" used in the first sentence should be replaced by the word "low". Negligible implies that spawning of northern pike in the spring and the production of forage fish in Indian Creek is unimportant. The classification of a stream as second quality warm water does not mean that the fishery of the stream will not be affected by stream modification. In fact, channelization will have adverse effects on stream fisheries, regardless of the species composition."

Response: The word negligible on page 68, paragraph 5 has been replaced with the word low.

7. Comment: "We request that the enclosed report of the Fish and Wildlife Service of November 15, 1972, accompany this work plan when it is forwarded to the Congress."

Response: Your report is included in Appendix H of the Final Environmental Impact Statement for Indian Creek.

ENVIRONMENTAL IMPACT STATEMENT

1. Comment: "Page 3, Land Treatment, Paragraphs 3, 4, and 6--These paragraphs should define the extent for which each of the land treatment practices will be used as is outlined in respect to forest land (paragraph 5, page 3)."

Response: See response to Work Plan, Comment 2.

2. Comment: "Page 5, Structural Measures, Paragraph 1--This paragraph should specify what species of cool season perennial grasses are to be seeded. The value of these reseeded areas to wildlife will depend on the species composition and the kind of maintenance work performed."

Response: The seeding mixture will be as given in the last paragraph, page 8, as follows: All seedings will be applied at the following rate per acre: 10 lbs. creeping red fescue, 20 lbs. tall fescue, 2 lbs. Kentucky bluegrass, 1 lb. redtop, 2 lbs. timothy, and 5 lbs. birdsfoot trefoil. The trefoil is added to make a long-lived grass-legume mixture of value for wildlife. Maintenance items are discussed on page 16. Among these items is item 5 which suggests maintenance work be done after completion of the nesting season.

3. Comment: "Page 12, Structural Measures, Paragraph 5--It is asserted that no known cultural values will be adversely affected. However, the statement lacks evidence of consultation with the State Archaeologist (Dr. James E. Fitting, Michigan History Division, Michigan Department of State, 208 North Capitol Avenue, Lansing, Michigan 58918) or any indication of the adequacy of previous archaeological survey coverage in the area. Dr. Fitting should be consulted for information and recommendations concerning archaeological values in the project area. It may be necessary to conduct a professional archaeological survey of all areas to be affected in order to locate and assess presently unrecorded cultural values in the area of the proposed project. If it is determined that any such remains will be adversely affected by the proposed action, measures should be taken to preserve the endangered remains or to mitigate the impact through professional archaeological salvage excavation. The statement should detail arrangements that have been made to provide for such a survey and mitigation, if necessary."

Response: Arrangements have been made with the Michigan History Division to survey the project work area. A preliminary search of the available data indicates nothing of concern exists in the area. A detailed survey of the project area

ENVIRONMENTAL IMPACT STATEMENT (continued)

is being made by the state. If any archeological evidence is uncovered appropriate state and federal officials will be notified. Construction will not commence until any salvagable material can be reclaimed. The statement has been modified on page 12 to reflect this data.

4. Comment: "Page 29, Archeological and Historical Resources, Paragraph 3--The statement should clearly reflect that the State Historic Preservation Officer (Mr. Samuel Milstein, Acting Director, Recreation, Department of Natural Resources, Mason Building, Lansing, Michigan 48926) was consulted to determine whether the proposal will affect any cultural site which may be in the process of nomination to the National Register of Historic Places. Also, the statement should contain a copy of his response."

Response: The Michigan History Division has reviewed the project and has indicated that no historical, cultural, archeological or architectural resources will be affected. Mr. Samuel Milstein, the designated State Historic Preservation Officer has been contacted. His response will be sent to us after the Michigan History Division have completed their survey of the project area.

5. Comment: "Page 42, Structural Measures, Paragraph 1--We do not agree with the second sentence that states . . . aquatic and semi-aquatic species of plants, invertebrates and vertebrates, will benefit on a long-term basis . . . To our knowledge, channelization has seldom if ever, benefited a natural aquatic community, even over the long-term."

Response: Page 42, Paragraph 1 points out that the reduction of sediment, reduction of livestock wastes pollution by fencing portions of the channel and the removal of oxygen-demanding organic sludge will result in long-term water quality improvement and thus reestablishment of desirable aquatic species.

6. Comment: "Page 42 Structural Measures, Paragraph 4--This paragraph indicates an increase of wildlife habitat in the channel right-of-way. We question whether the resulting increase in wildlife habitat will support as much wildlife and the diversity of wildlife that presently exists in the channel right-of-way."

Response: See response to Work Plan Comment 5.

ENVIRONMENTAL IMPACT STATEMENT (continued)

7. Comment: "The wildlife value of 63.6 acres of channel right-of-way depend greatly upon the species composition of the newly created grassland, and the kind of maintenance work performed along the right-of-way. The habitat value of 220 acres of grassland which will be converted to cropland does not offset the loss to wildlife simply by providing food and cover."

Response: Species to be seeded on the channel right-of-way and maintenance work to be performed were discussed in response number 2 above. It is acknowledged that some losses will be experienced in the conversion of 220 acres of idle cropland to cropland. However, many other land treatment measures such as conservation cropping systems, crop residue use, critical area plantings, grassed waterways, forest wildlife habitat improvement, ponds, fishpond management, wildlife upland habitat management and wildlife wetland habitat management will be applied. These measures directly enhance and protect other fish and wildlife habitat throughout the watershed which will more than offset the possible losses.

8. Comment: "Page 42, Economic-Social, Paragraph 5--The Statement should be amended to include discussion of all mineral resources in the project area as well as the potential impact of the project on future mineral production."

Response: The Environmental Impact Statement has been modified on pages 19 and 43. There are no known surface or sub-surface mineral resources in the area nor is there any expected impact from the project on any future mineral production.

9. Comment: "Page 44, Favorable Environmental Effects, Item m--It should be pointed out that the wildlife cover in brush piles along the channel is only temporary. These brush piles will diminish with time and decay."

Response: Brush piles will serve as a temporary refuge until grasses and other vegetation are established. The Environmental Impact Statement has been modified on pages 42 and 44 to insert the word temporarily.

10. Comment: "Page 44, Favorable Environmental Effects, Item l--Temporary floods such as those which occur in Indian Creek Watershed do not present a long-term hazard to wildlife habitat."

Response: See response to Work Plan Comment 1.

ENVIRONMENTAL IMPACT STATEMENT (continued)

11. Comment: "Page 44, Adverse Environmental Effects, Item f--This statement indicates that wildlife will return to the area after the construction period; however, much of the wildlife may not re-establish because of changes in the habitat as a result of construction activities."

Response: See response to Work Plan Comment 4.

ENVIRONMENTAL PROTECTION AGENCY

Environmental Impact Statement

1. Comment: "Only a small segment of the Indian Creek Watershed is included in this project and the protection is minimal (3 year flood). Therefore, a large segment of the watershed will remain unprotected and untreated."

Response: The entire watershed, 20,360 acres, is included in the project and will receive the benefits of the accelerated land treatment program. Note on page 3 the acres which will be adequately treated. Consistent with sponsors objectives and sound engineering and economic feasibility studies, structural measures were planned to benefit 2,225 acres, about 11 percent of the watershed area. Study and observation of the remaining area showed that structural measures were either not needed or were not feasible.

The 2,225 acres benefited by structural measures will receive three year flood protection. Hydrologic and economic analyses of watersheds planned and built in the last 20 years show that 3-5 year flood protection will derive 60-80 percent of potential agricultural benefits. For the type of agriculture in this watershed, economic returns diminish substantially for increasing levels of flood protection. In addition, there does not appear to be any environmental advantages to larger channels required by higher levels of protection.

2. Comment: "It was evident from our field inspection of the project area and from the EIS that the current landowners are doing little to improve drainage conditions or adopt necessary land treatment measures. Therefore, we believe that until your agency receives additional local cooperation, the project has minimal chance for success."

ENVIRONMENTAL PROTECTION AGENCY (continued)

Response: Major problem is a lack of outlets and therefore a farmer can do little on his own. However, local sponsors relate that where drainage is needed and outlets are available, drainage is being improved and maintained at an average or normal rate for the region and type of agriculture. Land treatment for erosion control is about average for the State and type of agriculture. Pages 29 and 30 of the Environmental Impact Statement shows that 59 percent of landowners in the watershed are cooperators with the soil conservation districts and that 52 farmers or 39 percent have conservation plans. Accelerated technical assistance with the project will result in an increase in conservation treatment.

Local sponsors desire to have the project constructed and have agreed to pay the local costs involved which amount to \$230,400 as shown on page 17.

3. Comment: "If completed, the project is expected to have an adverse impact upon the groundwater levels in the project area. The EIS should address the effects of lowering the groundwater upon wetlands, wooded areas, well production and surface water flows."

Response: Wetland areas within the problem area are located where no channel deepening will take place, therefore, no loss of wetlands will occur.

An evaluation of the effect of project works on soil-moisture relationships in wooded areas indicates there will be no significant woodland species change and no adverse effects.

Forest productivity will be increased in the benefited area, primarily from improved surface drainage.

Well production--the high water table will be lowered to accommodate root zone depth of crops on the agricultural land. In this high precipitation region there will be no adverse effect on recharge of water supplies, for well production. Surface water flows are not affected volume-wise by this project. There is some modification of peak discharges as discussed on page 37 and as shown by hydrographs on pages 38, 39 and 40.

4. Comment: "Consideration should be given to the potential increase in nutrient input to the surface waters from agricultural acreage and feedlot runoff due to the improved drainage conditions in the project area. The effects upon water quality in the project area and downstream should be addressed."

ENVIRONMENTAL PROTECTION AGENCY (continued)

Response: Runoff will be reduced 2-4 percent. Sediment, a vehicle for transport of nutrients will be reduced as a result of project actions (see page 36 EIS). Flood protection and improved drainage will induce increased application rates of fertilizers and pesticides. Most of these nutrients will be removed as the crops are harvested. About 25,000 pounds of Nitrogen will be added and about 51,700 pounds removed. Therefore, none of the added Nitrogen will be available to enrich streams. About 32,000 pounds of Phosphate will be added and 20,000 pounds removed. Phosphate becomes fixed to soil particles at a rate estimated as high as five to one. The added Phosphate as a result of the project will not be available to enrich the streams. About 45,200 pounds of Potash will be added and 47,500 pounds removed.

There are no large feedlot operations in the watershed. Rather, there are several barnlot operations of 25 animals or less. There are several small dairy operations. Projections do not indicate shifts in type of agriculture with or without project. There will be no project influenced effects on runoff from barnlots.

5. Comment: "In Sections I and II of Indian Creek and all of Adams Drain, we suggest that construction activities be carried out when there is no flow in the ephemeral portions of the watershed. This would minimize the impacts upon water quality by reducing some of the sediment loads in these streams. Temporary sediment structures should be placed in the channel where necessary to further minimize the impacts upon water quality."

Response: The nature of contract operations precludes this, however, pages 4-12 sets forth proposed construction methods and sediment control. These include such items as sediment basin, daily seeding, final seeding and mulching, surface water inlets and tile outlets. Any additional sediment control measures needed during construction will be used as conditions dictate.

6. Comment: "Along Section II on Indian Creek, the clay soil has little resistance to erosion and poor permeability characteristics. Therefore, we suggest that organic material be mixed with this soil to improve its drainage capacity, its erosion resistance and its potential to grow grasses along the channel cut."

Response: Past experience shows that this method is not necessary in Michigan to get excellent vegetative growth and cover. Daily seeding, and seeding and mulching provides adequate cover and protection.

ENVIRONMENTAL PROTECTION AGENCY (continued)

7. Comment: "In areas that are wooded on both sides of a channel, we suggest that work be conducted within the channel, to eliminate the need for a travelway on one side of the channel. All clearing and snagging should be undertaken during the seasons when there is no flow in the channels, and if possible, spoil should be disposed outside the wooded areas."

Response: It is not practical nor economical to construct in this manner. Clearing of wooded areas and spoil disposal and placement will be handled to provide for proper operation and maintenance of project works and minimize adverse environmental impacts. Clearing of wooded areas and clearing and snagging will be kept to the minimum required to provide for functioning of the channels as a flood and drainage way. This is discussed on pages 4-12 in the Environmental Impact Statement.

8. Comment: "As suggested in our letter of September 19, 1973, it would be appropriate for all tables in the EIS to include the consideration of a three-year frequency flood, since this is level of protection provided by the project."

Response: The tables on page 37 have been modified to include the 3-year event.

9. Comment: "An analysis of the spoil material should be conducted to determine the possible effects upon surface and ground-water supplies."

Response: Soil surveys and soil borings do not indicate any problems will arise.

10. Comment: "The responsibility and schedule for maintenance of the rock drop structure and the sediment basin as well as further development of proposed structural aspects of the project, i.e., surface water drainage inlets, drop structures and sediment basins should be addressed."

Response: This is discussed on page 16 of the Statement. The Indian Creek Inter-county Drainage Board and the Adams Drain Inter-county Drainage Board will be responsible for operation and maintenance of all project works within their areas of jurisdiction. This authority and responsibility includes surface water drainage inlets, drop structures and sediment basins and other appurtenances installed during the project installation period and subsequent to this period.

While the sediment trap is a temporary measure used during construction, and until vegetation is established, its side slopes will be seeded and maintained with vegetative cover even after the project installation period.

ENVIRONMENTAL PROTECTION AGENCY (continued)

Specific operations and maintenance agreements will be executed prior to letting of contracts for construction.

11. Comment: "We must reiterate our concern for the inadequacy of septic systems within the project area and need for a centralized wastewater treatment plant for the Village of Clifford."

Response: Correction of this problem is not within the scope of authority of Public Law 566. Clifford has been cited by the Michigan Water Resources Commission for polluting surface waters and is taking steps to rectify the problem.

WORK PLAN

1. Comment: "Our review of the Draft Watershed Work Plan dated March 1974 for the Indian Creek Watershed has been completed. As stated in our previous comments, it appears to us that actual benefits occurring from this project will be minimal and will affect a very small number of landowners. This opinion is based primarily on the fact that the area involved is subject to a very low demand as development property and also the acreage gained through drainage is only of marginal agricultural value. These facts do not seem to justify the channelization and drainage proposed even though a favorable benefit-cost ratio has been assigned to the project."

Response: See response to EIS Comment 1. Page 47 of the Work Plan discusses project benefits. No benefits were claimed for development property. Future crop yields as indicated on page 44 indicated the effects of improved drainage and reduced flooding.

2. Comment: "Net annual monetary benefits foregone by not implementing the project are expected to be \$13,040 (page 22, paragraph 3). This figure does not agree with that given in the previous Work Plan (dated August 1973) of \$4,500 (page 17, paragraph 2). This discrepancy should be explained."

Response: Revised normalized prices for agricultural crops were issued by the U. S. Water Resources Council in February 1974. These were used to update benefits. Current construction costs were used to update installation costs. These data are shown in Table 6 on page 64. The difference between the average annual benefits and costs is \$13,040 which represents current net annual monetary benefits foregone by not implementing the project.

WORK PLAN (continued)

3. Comment: "The investigation and findings of the Michigan Water Resources Commission which resulted in the citation served to the Village of Clifford (page 7, paragraph 1) should be discussed in detail."

Response: On August 14, and 21, 1969 field personnel from the Bureau of Water Management, Michigan Department of Natural Resources determined that sanitary wastes were apparently entering the surface waters near Clifford. This was based on observations and limited water quality tests. A letter was written to the village on December 9, 1969, advising them of the tests and notifying them that they were in possible violation of Section 6A of Public Act 245. Michigan Water Resources Commission requested that the community take corrective action. The Commission has made no further investigations nor taken any additional action.

4. Comment: "The Work Plan should discuss the responsibility for maintenance of the proposed rock drop structure and sediment basin. All structural aspects of the project should be more completely described."

Response: See response to EIS Comment 10.

5. Comment: "As proposed, the project will have a significant effect upon the level of the water table throughout the project area. The impact of this action should be discussed, particularly in relation to impact upon wetlands, wooded areas, well production and surface water flows."

Response: See response to EIS Comment 3.

6. Comment: "A discussion of present water quality conditions in the project area and the potential project effects upon surface waters should be included. Consideration should be given to adverse effects due to increased nutrient input from agricultural fields and runoff from feedlots."

Response: Present water quality is discussed under "Water-Quality Problems" on page 18. Environmental impacts discussed on page 45, paragraph 1, relating to an improved and reestablished aquatic community would apply also to water quality improvements with project installed. See response to EIS Comment 4 for a discussion of effects of increased fertilizer use.

ADVISORY COUNCIL ON HISTORIC PRESERVATION

1. Comment: "Under Section 2(a) of the Executive Order, Federal agencies are required to locate, inventory, and nominate eligible historic, architectural and archeological properties under their control or jurisdiction to the National Register of Historic Places. The results of this survey should be included in the Environmental Statement as evidence of compliance with Section 2(a)."

Response: Contact has been made with the Michigan History Division and the project work areas are being surveyed. Their preliminary findings indicate that there are no archeological, architectural or historical properties involved in the project area. The statement on page 12 has been modified to clarify this point.

2. Comment: "Until the inventory required by Section 2(a) is complete, Federal agencies are required by Section 2(b) of the Order to submit proposals for the transfer, sale, demolition, or substantial alteration of federally-owned properties eligible for inclusion in the National Register to the Council for review and comment. Federal agencies must continue to comply with Section 2(b) review requirements even after the initial inventory is complete, when they obtain jurisdiction or control over additional properties that are eligible for inclusion in the National Register or when properties under their jurisdiction or control are found to be eligible for inclusion in the National Register subsequent to the initial inventory. The environmental statement should contain a determination as to whether or not the proposed undertaking will result in the transfer, sale, demolition or substantial alteration or eligible National Register properties under Federal jurisdiction. If such is the case, the nature of the effect should be clearly indicated as well as an account of the steps taken in compliance with Section (b) (Procedures for compliance with the Executive Order are detailed in the Federal Register of January 25, 1974, "Procedures for the Protection of Historic and Cultural Properties," pp. 3366-3370)."

Response: EIS has been modified on page 12 to show that the project will not result in the transfer, sale, demolition or substantial alteration of any Federally owned properties or eligible National Register properties.

3. Comment: "Under Section 1(3), Federal agencies are required to establish procedures regarding the preservation and enhancement of non-federally owned historic, architectural, and archeological properties in the execution of their plans and programs.

ADVISORY COUNCIL ON HISTORIC PRESERVATION (Continued)

"The Environmental Statement should contain a determination as to whether or not the proposed undertaking will contribute to the preservation and enhancement of non-federally owned districts, sites, buildings, structures and objects of historical, architectural or archeological significance."

Response: Soil Conservation Service has established procedures regarding preservation and enhancement of non-federally owned historic, architectural, and archeological properties as related to execution of its programs. These plans are detailed in the June 3, 1974 Federal Register and the Watershed Protection Handbook and would apply if any historic, architectural or archeological properties were involved.

The Environmental Impact Statement has been modified on page 12 to show that inasmuch as there are no sites in this area, the proposed watershed project will not contribute to the preservation and enhancement of non-federally owned objects of historical, architectural or archeological significance.

4. Comment: "To insure a comprehensive review of historical, cultural, archeological, and architectural resources, the Advisory Council suggests that the Environmental Statement contain evidence of contact with the appropriate State Historic Preservation Officer and that a copy of his comments concerning the effects of the undertaking upon these resources be included in the Environmental Statement. The State Historic Preservation Officer for Michigan is Mr. Samuel Milstein, Acting Deputy Director-Recreation, Department of Natural Resources, Mason Building, Lansing, Michigan 48926."

Response: The Michigan History Division has reviewed the project and has indicated that no historical, cultural, archeological or architectural resources will be affected. Mr. Samuel Milstein, the designated State Historic Preservation Officer has been contacted. His response will be sent to us after the Michigan History Division have completed their survey of the project area.

MICHIGAN DEPARTMENT OF NATURAL RESOURCES

1. Comment: "It would be helpful in reviewing the EIS if comments on the resource problems of the area were confined to the section designated for this description, as found on page 31. At numerous earlier places in the section entitled "Planned Project" and "Environmental Setting" (i.e., page 5, 2nd paragraph, page 18, 4th paragraph, page 22, paragraph 4) the need for dredging and/or snagging is mentioned. This

MICHIGAN DEPARTMENT OF NATURAL RESOURCES (Continued)

would seem repetitive and heavily oriented toward project justification."

Response: Soil Conservation Service guidelines as set forth in the June 3, 1974 Federal Register were followed. These regulations require the description of problems in several sections. This material is presented in sufficient detail to give the reader a clear and adequate picture of conditions in the watershed as they relate to water and related land resource problems, environmental values and the works of improvement to be installed.

2. Comment: "Page 2, Paragraph 2. This project has no binding contracts or agreements that will provide any assurance that adequate land treatment will be carried out on 2,750 acres of cropland, 600 acres of forest land, 270 acres of other lands. What percent of the land treatment measures are being carried out on Michigan projects? In reality, this project can take credit for only the percentage of land treatment measures expected to be completed, and must subtract the additional erosion, loss of forest and wildlife habitat that will occur because the project will encourage and provide the potential for more intensive agricultural practices."

Response: It is agreed that no binding contracts will assure that land treatment will be carried out as indicated, however, the local sponsors have agreed to fulfill land treatment objectives as outlined. The acres planned to be treated are realistic goals based on past accomplishments. Experience from other watersheds in Michigan shows that about 85% of the planned land treatment measures have been applied. Goals have been exceeded in many agronomic, cultural, and wildlife measures. Drainage measures lag behind other measures because of cost and time factors.

There is no land in forest or pasture which is planned to be converted to cropland. (See page 41).

It is planned that land undergoing more intensive use will be adequately treated to reduce erosion and enhance wildlife habitat.

3. Comment: "Page 5, Paragraph 4. An 'important wooded area' is mentioned. The significance of the woodlot is not described. The proposed plans are directed toward preserving this area yet no description of its uniqueness or resources is provided."

MICHIGAN DEPARTMENT OF NATURAL RESOURCES (Continued)

Response: This sentence has been modified on page 5 to read as follows: A valuable oak-maple wooded area exists in Section 9, T10N, R11E. It will not be affected by project action.

4. Comment: "Page 5, Paragraph 7. The standing trees along the channel which at some later date may impair the functioning of the channel as a result of windfalls will also be removed. We wonder at the wisdom of this action. The benefits the trees provide before they fall into the channel would seem to outweigh the need to cut them now."

Response: This statement has been modified on page 5 to read as follows: The standing trees along the channel which are dead or diseased and which may impair the functioning of the channel as a result of windfalls will also be removed.

5. Comment: "Page 12, Paragraph 5. It is difficult to understand how wetland areas will remain intact within the problem area. Completion of the present project can only accelerate privately financed drainage. Forest productivity will be increased within the area by the increased drainage. It would seem that the wetlands would also be affected. Just how will wetlands be retained?"

Response: The wetland areas identified on Exhibit 8 will not be drained by project action because additional channel depth is not being provided in these areas. Forest productivity will be increased in the benefited area, primarily from improved surface drainage.

It is acknowledged that the present project will accelerate privately financed drainage. This is necessary to solve drainage problems on many of the 2,225 acres of land in the benefited area.

6. Comment: "Page 24-25. Since common names of plants and animals are often confusing from region to region, it would be helpful if scientific names were added to the lists of plants and animals."

Response: It is not believed that confusion exists.

7. Comment: "Page 25, Paragraph 3. Use by migrating waterfowl is mentioned. It should be noted that mallards, woodducks, and blue-winged teal nest in this area."

Response: This has been added to the Environmental Impact Statement on page 25.

MICHIGAN DEPARTMENT OF NATURAL RESOURCES (Continued)

8. Comment: "Page 25, Economic Resources. This is an improper heading. Should it not be Agricultural Resources?"

Response: Soil Conservation Service guidelines in the Federal Register require discussion of all economic resources in the watershed. In this particular watershed agriculture happens to be the main economic resource.

9. Comment: "Page 26, Paragraph 2. If agricultural land is valued at \$220 per acre and floodplain lands at \$120 per acre, would it not be much cheaper to buy the land for a valley preserve rather than spend the money for drainage?"

Response: This alternative is discussed on page 45. Cost would be more than double the existing project cost.

10. Comment: "Page 34, Paragraph 5. In the discussion of water quality problems, decaying vegetation in the channels is listed as a major source of nutrients. Would aquatic and semi-aquatic vegetation be present in quantity in the channels to such a degree if nutrients were not already present? Is it not more likely that agricultural runoff provides a major source of nutrients?"

Response: The last sentence on water quality problems has been modified on page 34 to read as follows: All sources of nutrients are not known but nutrients support plant matter which is decaying within the channel and is a problem.

11. Comment: "Page 36, Paragraph 1. Benefits from land treatment practices are listed. Land treatment practices may have the potential to reduce flooding but what percentage will actually be carried out? This project can not guarantee compliance. Also, will not more intensive land use on 1,324 acres plus the conversion of 220 acres from idle land to row crops increase the erosion rate? If you can quantify the effects of land treatment for which the project has no insurance of completion, then you should be able to attempt to quantify the additional erosion rates caused by the more intensive land use."

Response: Land treatment measures applied on more intensively used cropland will prevent increased erosion. Also see response to Michigan Department of Natural Resources comment 2.

12. Comment: "Page 36, Paragraph 3. What are the forest land treatment measures impacts? Also, the claim that increased drainage will enhance the natural area aspects of forests is puzzling. Natural forest areas need not be well-drained to be aesthetically appealing. In fact, many forested areas well suited for

MICHIGAN DEPARTMENT OF NATURAL RESOURCES (Continued)

recreation are within floodplains and not managed for wood products."

Response: Forest land treatment measure impacts are discussed in the third paragraph, page 36. The last sentence has been revised to indicate that these areas are managed areas which may contribute to beautification and aesthetic appeal.

13. Comment: "Page 36, Paragraph 4. Forest practices may improve infiltration and increase water storage capacity. How will this function in proximity to deeper, straighter, larger capacity channels that lower storage capacity?"

Response: No channel straightening is planned. The effect of channel work without additional drainage practices is approximately 200 feet either side of the channel. This would reduce water-logged soils, thus making available water storage capacity in the soil between storms. Humus produced by this vegetative growth is conducive to infiltration.

14. Comment: "Page 42, Paragraph 1. The increased use of fertilizer and pesticides is noted. The impact of this increased use should be discussed."

Response: See response to comment 4 from Environmental Protection Agency.

15. Comment: "Page 42, Paragraph 4. The wildlife habitat evaluation by SCS criteria includes only the 63.6 acres involved on the channel right-of-way. We feel that all land use changes as a result of the project should be included in the evaluation. This total evaluation would include the 220 acres that will change from grassland to cropland. Woodlands and brush are the critical habitat acreages. Grasslands and small grains in this watershed are more than sufficient. With this in mind we doubt whether the total habitat loss would be 'offset' by land treatment which provides some food and cover. We would suggest that the terminology be changed to 'partially offset'."

Response: The paragraph referenced above was describing wildlife habitat on the channel right-of-way. This is under the direct control of the sponsors with assurances that these conditions will exist. While it is acknowledged that some losses will be experienced in the conversion of 220 acres of idle cropland to cropland, many other land treatment measures will be applied which directly enhance and protect other fish and wildlife habitat throughout the watershed.

MICHIGAN DEPARTMENT OF NATURAL RESOURCES (Continued)

16. Comment: "Page 43, Paragraph 4. It is stated that 48 percent population increase expected in Lapeer County in 20 years will not have 'significant impact.' How was this conclusion arrived at?"

Response: Population projections show Lapeer County will increase by 25,183 in twenty years. This is an average density of about 118 persons per square mile. Population densities higher than this are being supported on other land areas without seriously depleting life sustaining resources. Therefore, it was concluded that the expected population increase need not seriously or significantly affect the resource base if prudence is used in assimilating the additional people.

17. Comment: "Page 44, Paragraph 1. Item '1' indicated that reduced flood hazard is a favorable wildlife effect. There are no data available to indicate that annual floods, especially in this area, are a significant hazard to the wildlife using the area. If anything, the nutrients carried onto the floodplain may make them more productive for wildlife foods, etc. Also, the plus habitat values of brush piles, in our opinion, will not make up for the natural habitat lost."

Response: We continue to disagree. The excerpt quoted in the response to comment 10 from the U. S. Department of Interior supports our position. It is acknowledged that if nutrients are carried onto the floodplain this would promote production. The land treatment program, however, will encourage the holding of the nutrients where they are applied. No attempt was made to indicate that brush piles would replace other habitat.

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LIST OF APPENDIXES

Appendix A - Glossary of Land Treatment Practices to Be Installed

Appendix B - Description of Soils

Appendix C- Wildlife Habitat Evaluation Criteria

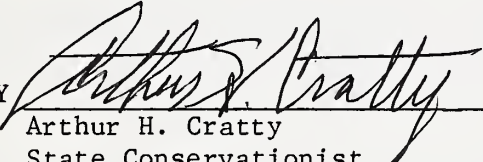
Appendix D - Structure Data - Channels

Appendix E - Structure Data - Rock Drop Structure

Appendix F - Comparison of Benefits and Costs for Structural Measures

Appendix G - Project Map

APPROVED BY


Arthur H. Cratty
State Conservationist

DATE

10/25/74

APPENDIX A - GLOSSARY OF CONSERVATION LAND TREATMENT PRACTICES TO BE
INSTALLED a/

Conservation Cropping System - Growing crops in combination with needed cultural and management measures. Cropping systems include rotations that contain grasses and legumes as well as rotations in which the desired benefits are achieved without the use of such crops. The purpose is to improve or maintain good physical condition of the soil; protect the soil during periods when erosion usually occurs; help control weeds, insects, and diseases; and meet the need and desire of farmers for an economic return. It is applicable on all cropland and on certain recreation and wildlife land.

Critical Area Planting - Planting vegetation such as trees, shrubs, vines, grasses, or legumes on critical areas. (Does not include tree planting mainly for wood products). The purpose is to stabilize the soil; reduce damage from sediment and runoff to downstream areas; improve wildlife habitat; and enhance natural beauty. It is applicable on sediment-producing, highly erodible or severely eroded areas, such as dams, dikes, mine spoil, levees, cuts, fills, surface-mined areas, and denuded or gullied areas where vegetation is difficult to establish with usual seeding or planting methods.

Crop Residue Use - Using plant residues to protect cultivated fields during critical erosion periods. The purpose is to conserve moisture; increase infiltration; reduce soil loss; and improve soil tilth. It is applicable on land where adequate crop residues are produced.

Drain - A conduit, such as tile, pipe, or tubing, installed beneath the ground surface and which collects and/or conveys drainage water. A drain may serve one or more of the following purposes:

1. Improve agricultural production by lowering the water table.
2. Intercept and prevent water movement into a wet area.
3. Relieve artesian pressures.
4. Remove surface runoff.
5. Facilitate leaching of saline and alkali soils.
6. Serve as an outlet for other drains.
7. Provide ground water regulation and control for sub-irrigated areas.

Drains are used in areas having a high water table where benefits of lowering or controlling groundwater or surface runoff justify the installation of such a system.

Drainage Field Ditch - A graded ditch for collecting excess water within a field. This does not include Drainage Main or Lateral, or Grassed Waterway or Outlet. Applicable sites are flat or nearly flat lands that:

a/ U. S. Department of Agriculture, Soil Conservation Service, National Handbook of Conservation Practices, 1971.

1. Have soils of low permeability or shallowness over barriers, such as rock or clay, which hold or prevent ready percolation of water to a deep stratum.
2. Have surface depressions or barriers which trap rainfall.
3. Have insufficient land slope for ready movement of runoff across the surface.
4. Receive excess runoff or seepage from uplands.
5. Require removal of excess irrigation water.
6. Require control of the groundwater table.
7. Have adequate outlets available for disposal of drainage water by gravity flow or pumping.

Drainage field ditches are installed to:

1. Drain surface depressions.
2. Collect or intercept excess surface water such as sheet flow from natural and graded land surfaces or channel flow from furrows for removal to an outlet.
3. Collect or intercept excess subsurface water for removal to an outlet.

Drainage Main or Lateral - An open drainage ditch constructed to a designed size and grade. Does not include Drainage Field Ditch. The purpose of mains and laterals is to dispose of excess surface or subsurface water, intercept groundwater, or to control groundwater levels; to provide for leaching of saline or alkali soils; or a combination of these objectives.

Fishpond Management - Developing or improving impounded water to produce fish for domestic use or recreation. The purpose is to improve or maintain fish production and fishery use by making a favorable water habitat; supplementing natural food supplies; and reducing competition from unwanted plants and animals. It is applicable in ponds, lakes, and reservoirs where a crop of fish is wanted.

Forest Wildlife Habitat Management - Retaining, creating, or managing forest wildlife habitat. Its purpose is to keep, make, or improve forest habitat for desired kinds of wildlife. It is applicable on forest sites that are suitable for the kinds of wildlife food or cover plants that are needed.

Grade Stabilization Structure - A structure to stabilize the grade or to control head cutting in natural or artificial channels. (Does not include straight pipe overfill structures used in drainage and irrigation systems for structures for water control). Grade stabilization structures are installed to stabilize the grade in natural or artificial channels, prevent the formation or advance of gullies, and reduce environmental and pollution hazards. These structures apply where the concentration and flow velocity of water are such that structures are required to stabilize the grade in channels or to control gully erosion. Special attention will be given to maintaining or improving habitat for fish and wildlife, where applicable.

Grassed Waterway or Outlet - A natural or constructed waterway or outlet shaped or graded and established in vegetation suitable to safely dispose runoff from a field, diversion, terrace, or other structure. The purpose is to prevent excessive soil loss and formation of gullies. It is applicable where concentrated runoff must be disposed of at safe velocities.

Grazing Control - Limiting livestock grazing to that which is possible without inducing damage to vegetation, soil, or related resources. Its purpose is to maintain adequate cover for soil protection, to conserve and maintain available moisture supplies, to protect wildlife habitat and recreation values, and to maintain or improve the quality and quantity of the wood crop. It is applicable where soil, hydrologic, wildlife and recreation values, and wood crops are damaged or impaired by livestock.

Harvest Cutting - Systematically removing some of the merchantable trees from an immature stand or all trees from a designated part of a woodland. Its purpose is to harvest some of the merchantable trees from an immature stand to improve the conditions for forest growth and/or to harvest trees in a manner that encourages the regeneration and normal development of a new stand. It is applicable where the site, size, species, and density of a forest stand make the planned and systematic harvesting of forest trees economically and silviculturally feasible for improving the growth of the remaining trees or to regenerate the stand.

Minimum Tillage - Limiting the number of cultural operations to those that are properly timed and essential to produce a crop and prevent soil damage. The purpose is to retard deterioration of soil structure; reduce soil compaction and formation of tillage pans; and to improve soil aeration, permeability, and tilth. It is applicable on all cropland and on certain recreation and wildlife land.

Pasture and Hayland Management - Proper treatment and use of pastureland or hayland. The purpose is to prolong life of desirable forage species; to maintain or improve the quality and quantity of forage; and to protect the soil, and reduce water loss. It is applicable on all pastureland or hayland.

Pasture and Hayland Planting - Establishing and re-establishing long-term stands of adapted species of perennial, biennial, or reseeding forage plants. The purposes are to reduce erosion, to produce high quality forage, and to adjust land use. It is applicable on existing pasture and hayland or on land that is converted from other uses.

Pond - A water impoundment made by constructing a dam or embankment, or by excavating a pit or "dugout." Ponds are constructed to provide water for livestock, fish and wildlife, recreation, fire control, crop and orchard spraying, and other related uses.

Timber Stand Improvement - Improving a stand of timber by removing unmerchantable or unwanted trees, shrubs, or vines. Its purpose is to fully use the potential of a site; to maintain plant cover for soil protection; to improve stand competition by leaving the best trees, spaced for best growth; to improve the natural beauty, wildlife, or recreation value of the area. It is applicable in a woodland where a stand of trees is overstocked or where desirable trees are overtopped by less desirable trees, shrubs, or vines; where removing part of a stand will improve stand quality, or the recreation, wildlife, aesthetic, or hydrologic values of an area.

Tree Planting - Planting tree seedlings or cuttings. Its purpose is to establish a stand of trees for the conservation of soil and moisture, conservation beautification, watershed protection, and for the production of wood crops. It is applicable in open fields, understocked woodlands, beneath less desirable tree species, or other areas suitable for the production of wood crops, or where erosion control and watershed protection are needed, or where the enhancement of natural beauty is desired, or a combination of these.

Wildlife Wetland Habitat Management - Retaining, creating, or managing wetland habitat for wildlife. The purposes are to keep, make, or improve habitat for waterfowl, fur bearers, or other wildlife. It is applicable on wetland and land where water can be impounded or regulated by diking, ditching, or flooding.

Wildlife Upland Habitat Management - Retaining, creating, or managing wildlife habitat other than wetland. The purpose is to keep, make, or improve habitat for desired kinds of wildlife. It is applicable on sites (other than wetland) that are suitable for the kinds of wildlife food or cover plants that are needed.

APPENDIX B - DESCRIPTION OF SOILS a/

Belding Series - The Belding series is made up of somewhat poorly drained to gently sloping soils on till plains and lake plains in the central and northern parts of the country. These soils formed in sandy loam or loamy sand material underlain at a depth of 18 to 42 inches with loam to silty clay loam.

In a typical profile, the surface layer is dark grayish-brown sandy loam about 7 inches thick. The subsoil is about 33 inches thick. The upper 16 inches consists of dark-brown, friable sandy loam over light brownish-gray, friable sandy loam mottled with yellowish-brown. The lower part consists of brown, firm loam mottled with yellowish-brown and light brownish-gray over dark yellowish-brown, firm clay loam mottled with yellowish-brown and grayish-brown. The underlying material, at a depth of about 40 inches, is dark yellowish-brown, firm, limy clay loam mottled with grayish-brown.

Fertility is moderate, and the available water capacity is moderate. The water table is near the surface in spring, unless lowered by artificial drainage. Permeability is moderately rapid in the upper part of the profile and moderately slow in the lower part. Tilth is generally good.

Most areas of these soils are used for crops.

Boyer Series - The Boyer series is made up of well-drained, level to steep soils on outwash plains and moraines. These soils formed in sandy loam or loamy sand and are underlain at a depth of 24 to 42 inches by strata of limy sand and gravel.

In a typical profile, the surface layer is dark grayish-brown loamy sand about 7 inches thick, and the subsurface layer is light yellowish-brown loamy sand about 8 inches thick. The subsoil is about 15 inches thick; the upper 9 inches is strong-brown, friable sandy loam, and the lower part is yellowish-red, firm gravelly sandy clay loam. At a depth of about 30 inches is brown, loose, limy, stratified sand and gravel.

Fertility is moderately low. Permeability is moderately rapid. The available water capacity is moderately low; the moisture supply is generally not adequate for optimum growth of crops and is especially likely to be deficient during the dry summer months.

Most of the level to sloping acreage is farmed. Corn, small grain, and hay are the major crops. Much of the more strongly sloping acreage has been farmed in the past but is now idle or is growing up to brush and trees. The steepest areas remain in woods.

a/ U. S. Department of Agriculture, Soil Conservation Service and the Michigan Agriculture Experiment Station, Soil Survey of Lapeer County, Michigan, Washington: Government Printing Office, 1972.

Brookston Series - The Brookston series is made up of poorly drained, level or depressional soils on till plains. These soils formed in loam or light clay loam material.

In a typical profile, the surface layer is very dark brown loam about 12 inches thick. The subsoil, about 26 inches thick is gray, firm clay mottled with yellowish-brown. The underlying material, at a depth of about 38 inches, is light-gray, firm, limy loam mottled with brownish-yellow.

Fertility is high, the available water capacity is high, permeability is moderately slow, and runoff is very slow to ponded. The water table is high in spring and after rain in other seasons. The gray color of the subsoil results from prolonged saturation. After the soils have been drained and have dried out, they are easy to work and easy to keep in good tilth.

Most of the common crops can be grown in drained areas of Brookston soils.

Capac Series - The Capac series is made up of somewhat poorly drained, level to undulating soils on till plains. These soils formed in loamy material and were affected during formation by a fluctuating high water table.

In a typical profile, the surface layer is very dark grayish-brown fine sandy loam about 5 inches thick. The subsoil is about 29 inches thick. The upper 7 inches consists of yellowish-brown, very friable sandy loam over light brownish-gray, very friable sandy loam mottled with yellowish-brown. The lower 22 inches is grayish-brown and yellowish-brown, firm clay loam mottled with yellowish-brown, gray, and grayish brown. Below the subsoil, at a depth of about 34 inches, is gray, firm, limy loam mottled with yellowish-brown.

Fertility is high, and the available water capacity is high. Runoff is slow. Water that runs off higher surrounding soils accumulates, and the water table is within a foot or two of the surface in spring and after rain in other seasons. Permeability is moderately slow, except when the water table is high. After the soils have been drained and have dried out, they are easy to work and easy to keep in good tilth.

Most of the acreage is used for crops.

McBride Series - The McBride series is made up of well drained to moderately well drained, level to very steep soils on till plains and moraines. These soils formed in glacial material of sandy loam texture.

In a typical profile, the surface layer is dark grayish-brown sandy loam about 8 inches thick. The subsoil is about 47 inches thick. The upper 15 inches consists of yellowish-brown and pale-brown, very friable sandy loam. Below this is a 7-inch fragipan of light brownish-gray sandy loam. Below the fragipan is a 14-inch layer of dark-brown, firm sandy clay loam and then an 11-inch layer of yellowish-brown, friable loam. The underlying material, at a depth of 55 inches, is brown, friable, limy sandy loam.

Fertility is moderate, and the available water capacity is moderate. Run-off is slow to rapid, depending on the slope. Permeability is restricted in the fragipan but is moderate in the other layers. These soils dry out quickly and are ready for tillage early in spring.

The level to sloping soils of this series are used mainly for crops, including corn, oats and hay. The steeper ones are used for pasture or have remained in woods.

Oshtemo Series - The Oshtemo series is made up of well-drained, level to sloping soils on outwash plains and moraines. These soils formed in sandy loam or loamy sand underlain at a depth of 42 to about 66 inches with strata of limy sand and gravel.

In a typical profile, the surface layer is brown sandy loam about 8 inches thick. The subsurface layer, about 12 inches thick, is yellowish-brown, very friable loamy sand. The subsoil is about 32 inches thick. It consists of a 7-inch layer of yellowish-red, friable heavy light sandy loam, and a 16-inch layer of light yellowish-brown, loose light loamy sand. The underlying material, at a depth of about 52 inches, is light-gray, loose, limy, stratified sand and fine gravel.

Fertility is low. The available water capacity is moderately low; the moisture supply is rarely adequate for optimum growth of crops. Permeability is moderately rapid. The soils dry out quickly in spring and are easy to work.

Some areas of these soils are farmed, some are idle, and some are in woods. Corn, small grain, and hay are the major crops. Deep-rooted forage crops and other crops that resist drought and mature early are to be preferred.

Paulding Series - The Paulding series is made up of poorly drained to very poorly drained, level or depressional soils on lake plains. These soils formed in clayey material. They are the finest textured soils in the county.

In a typical profile, the surface layer is dark-gray clay about 8 inches thick. The subsoil is about 26 inches thick. The upper 15 inches is gray, very firm clay mottled with strong brown and yellowish-red. The lower 11 inches is olive-gray, very firm clay mottled with yellowish-brown. The underlying material, at a depth of 34 inches, is gray, very firm, limy clay mottled with yellowish brown and light olive brown.

Fertility is moderately high, and the available water capacity is moderately high. Permeability is very slow. Runoff is slow to very slow, and water ponds in depressions. The water table is near the surface; unless lowered by artificial drainage, it restricts the growth of roots and prevents early cultivation. The gray color is a result of prolonged saturation. Because of the clay texture and the high water table, these soils are slow to dry out and warm up. They puddle if farmed when wet, then dry out hard and cloddy and with impaired tilth.

About a third of the acreage is still in woods. Of the rest, part is now cultivated, part is used for native pasture, and part is idle.

Roselms Series - The Roselms series is made up of somewhat poorly drained, level to undulating soils on lake plains. These soils formed in glacial material of clayey texture.

In a typical profile, the surface layer is dark grayish-brown clay loam about 7 inches thick. The subsoil is about 16 inches thick. The upper 10 inches is grayish-brown, very firm clay mottled with dark brown, and the lower 6 inches is light olive-brown, extremely firm clay mottled with gray. The underlying material, at a depth of 23 inches, is light olive-brown, extremely firm, limy clay mottled with gray.

Fertility is moderately high. Permeability is very slow, and the available water capacity is moderately high. Runoff is slow to rapid, depending on the slope and the effects of erosion. The water table is high during periods of wet weather. The mottling is the result of prolonged saturation. This soils puddle if worked when wet, then dry out hard and cloddy and in poor tilth.

Corn and forage crops are grown in drained areas of these soils. Some areas are in native pasture, and some are idle.

APPENDIX C - WILDLIFE HABITAT EVALUATION CRITERIA a/

GUIDE TO IDENTIFYING HABITAT GAINS AND LOSSES

Vegetative Cover (Woody*, Grassy*, Crop*)

Habitat Gains

Direct

Vegetation established, pre-served or otherwise benefited at project cost.

Record acre-value gained.

EXAMPLES: Vegetation is planted or existing vegetation is fenced to exclude livestock such as on dams, spillways, channel banks and berms, and critical areas.

Indirect

Vegetation established, pre-served or otherwise benefited as a result of accelerated land treatment or changed land use.

Record acre-value gained.

EXAMPLES: Vegetation established, preserved or otherwise benefited such as by excluding livestock.

Direct

Vegetation lost or damaged as a result of the installation of structural measures.

EXAMPLES: Vegetation inundated, cleared or otherwise lost to dams, spillways, conservation pools, borrow areas or other measures.

EXAMPLES: Vegetation which grazing is increased or the vegetation is cleared and the land use is changed.

Habitat Losses

Indirect

Vegetation lost or damaged as a result of accelerated land treatment or changed land use.

Record acre-value lost.

* Vegetative type is dominant, occupying 90 percent or more of the area.

a/ Wade Hamor, "Guide for Evaluating the Impact of Water and Related Land Resources Development Projects on Fish and Wildlife Habitat," Soil Conservation Service, Lincoln, Nebraska, unpublished, 1972.

Guide to Measuring the Acre-Value of Woody Habitat. (Trees, Shrubs, Vines)

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- .2 Even aged hardwoods or conifer (not mixed); open understory; grain fields are more than 660 feet from woody cover; or overgrazing by livestock is obvious - trees show definite browse line; trunks are rubbed; shrubs are hedged and broken.
- .3 Mixed hardwoods and/or conifers of several ages; shrubs and herbaceous plants occupy less than 25 percent of the forest floor; grain fields are 330 to 660 feet from woody cover; or overgrazing by livestock is obvious - trees show definite browse line; trunks are rubbed; shrubs are hedged and broken.
- .5 Mixed hardwoods and/or conifers of several ages; shrubs and herbaceous plants occupy 25 to 50 percent of the forest floor; grain fields are about 330 feet from woody cover; or livestock browsing on lower tree branches and shrubs is evident but show only minor damage.
- .7 Mixed hardwoods and/or conifers of several ages; shrubs and herbaceous plants occupy more than 50 percent of the forest floor; grain fields are within 330 feet of woody cover; or livestock use is light with little evidence of browsing.
- .8 Mixed hardwoods and/or conifers of several ages; shrubs and herbaceous plants occupy more than 50 percent of the forest floor; grain fields are within 330 feet of woody cover; land use is wildlife land, woodland or, if listed as pasture, it is not grazed.
- 1.0 Same as .8 except the woody habitat is under public ownership or control and is managed for wildlife.

Guide to Measuring the Acre-Value of Grassy Habitat (Grass, Forbs)

- .1 Herbaceous cover is very closely grazed; livestock droppings numerous and obvious; annual weeds are present throughout the area; trees show definite browse line and trunks are rubbed; shrubs are hedged and broken.
- .3 Some herbaceous cover is left; livestock droppings well scattered and not especially obvious; annual weeds occur primarily on lower slopes immediately above the floodplain; browse line on trees evident but some lower branches are not browsed; shrubs are browsed but not broken.
- .5 Good grass cover is left by proper grazing management; annual weeds are practically eliminated; browse line, if any, is old; shrubs are lightly browsed.
- .7 Under use of forage is evident; woody plants show little evidence of browsing by livestock.
- .8 Land use is wildlife land or is pasture but vegetation is undisturbed except as used by wildlife.
- 1.0 Same as .8 except the grassy habitat is under public ownership or control and is managed for wildlife.

Guide to Measuring the Acre-Value of Farm Crops

- .3 Grain and seed crops not grown or if grown, the residue is fall plowed.
- .5 Grain and seed crops are grown; residue is disced or chopped in the fall; spring plowed.
- .8 Grain and seed crops are grown; residue is not disturbed in the fall; spring tillage, if any, does not include plowing.
- 1.0 Same as .8 except the crop is under public ownership or control and is managed for wildlife.

APPENDIX D - STRUCTURE DATA

CHANNELS

Indian Creek Watershed, Michigan

Channel Name	Station at Down-Stream End of Reach	Drainage Area (sq.mi.)	Capacity cfs		Water Surface Elev. 1/ (ft)	Hydraulic Gradient (ft/ft)	Channel Dimensions			"n" Value		Velocities		Excavation of (cu.yds.)	Type of Work5/	Type of Flow Channel Condition Before Improvement 6/ Project
			Q3	Req'd Design			Bottom Width (ft)	Flow Depth (ft)	Sides	As	Built Aged	As	As			
Indian Creek	110+30	2.0			831.8											M
	140+00		66	101	829.3	0.00085	4	4.2	2:1	0.04	0.025	1.94	2.91		II	
	158+20	2.6	66	70	827.0	0.00085	4	3.6	2:1	0.04	0.025	1.73	2.91	8,030		
	160+84				825.3			Existing								
	187+50	5.2	148	148	817.8	0.0028				0.04	0.04	1.66	2.85		III	
	216+80	6.3	180	180	817.6	0.00027						0.88	1.15			
	237+00	6.3	180	180	817.4	0.0012						1.96	2.36			
	265+80	7.20	183	183	815.1	0.0018						3.21	3.79			
	305+00	7.87	192	192	805.1	0.00053						1.51	1.65		PR	
	328+60	15.5	473	473	804.4	0.0003						3.28	3.62			
	346+40	18.1	494	494	798.0	0.0014						2.62	2.63			
	416+40	26.0	720	720	794.9	0.0006						2.12	2.35	None		
	Adams Drain	282+00	3.21			803.4										
382+50		5.31	152	157	795.4	0.0008	10	4.2	2:1	0.04	0.25	2.23	3.41	22,710 4/	II	

October 1974

- 1/ Bank full capacity
- 2/ Aged velocities for design Q3
- 3/ As built velocities for Q10 or bankfull, whichever is less
- 4/ Reflects total yardage for improvement including sediment basin
- 5/ II - enlargement of existing channel; III - cleaning out of man-made channel
- 6/ M - man-made ditch or previously modified channel
- 7/ I - intermittent flow; PR - perennial flow; E - ephemeral

APPENDIX E - STRUCTURE DATAROCK DROP STRUCTURE

Indian Creek Watershed, Michigan

Location	<u>Drop</u> (ft)	<u>Bottom</u> <u>Width</u> (ft)	<u>Estimated Quantities</u>	
			Rock (c.y.)	Filter (c.y.)
Adams Drain	2	10	140	45
STA 282+00				

October 1974

APPENDIX F - COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

Indian Creek Watershed, Michigan

(Dollars)

AVERAGE ANNUAL BENEFITS <u>1/</u>								
Evaluation Unit	Flood Damage Reduc- tion	More Intensive Land Use	Agr. Changed Land Use	Drain- age	Secondary	Total	Avg. Annual Cost <u>2/</u>	Benefit Cost Ratio
Multiple Purpose Channel Work	350	11,100	4,750	11,100	2,990	30,290	15,550	1.9:1.0
Project Adminis- tration	-	-	-	-	-	-	1,700	-
GRAND TOTAL	350	11,100	4,750	11,100	2,990	30,290	17,250	1.8:1.0

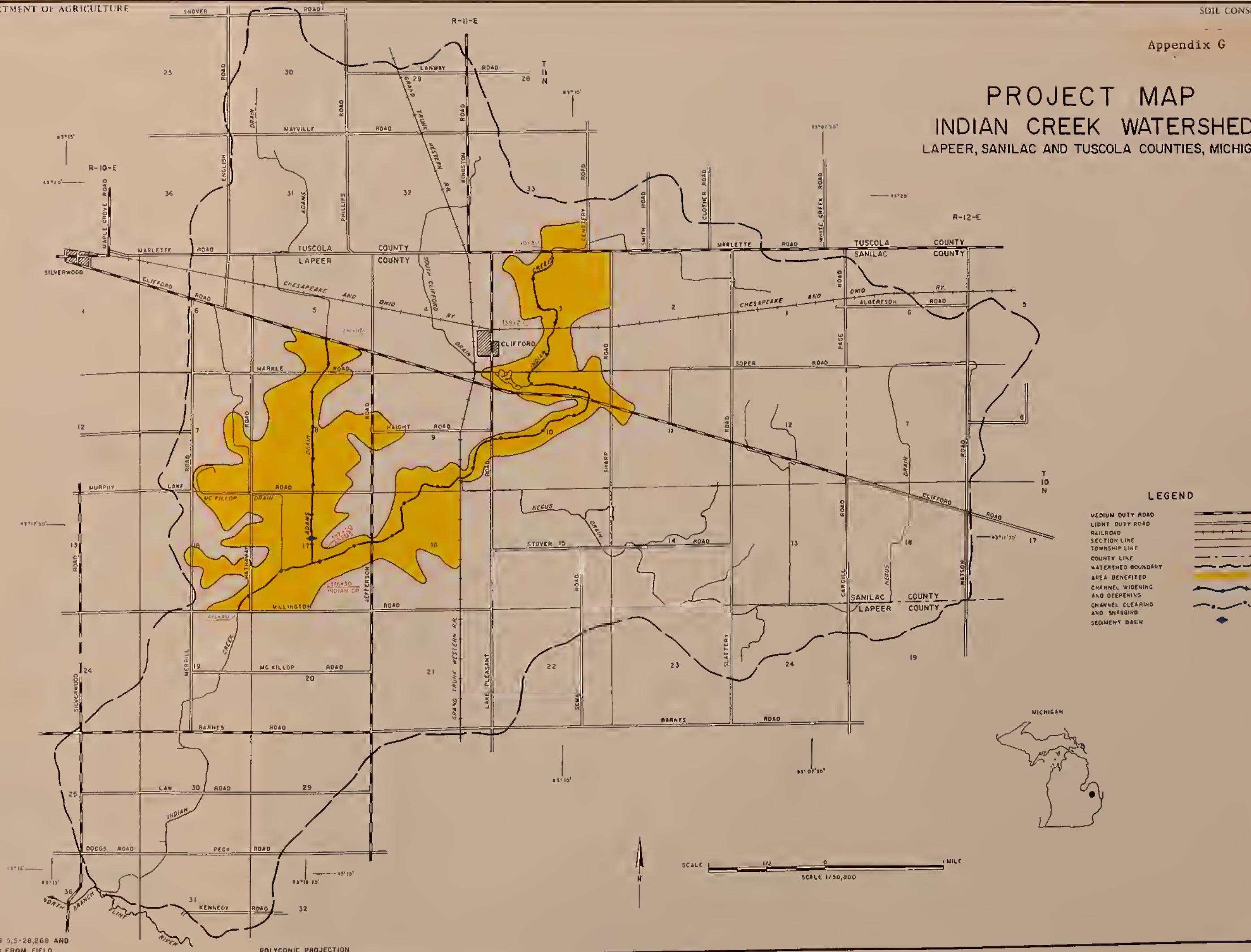
11/ Price Base Current Normalized; benefits rounded to nearest \$50.

2/ Includes project installation costs amortized at 6 7/8 percent interest for 50 years plus the annual cost of operation and maintenance.

PROJECT MAP

INDIAN CREEK WATERSHED

LAPEER, SANILAC AND TUSCOLA COUNTIES, MICHIGAN





DEPARTMENT OF THE ARMY
DETROIT DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1027
DETROIT, MICHIGAN 48231

APPENDIX H 93

IN REPLY REFER TO

NCEED-ER

4 June 1974

r

Mr. Arthur H. Cratty
State Conservationist
Soil Conservation Service
U. S. Department of Agriculture
1405 South Harrison Road
East Lansing, Michigan 48823

Dear Mr. Cratty:

Reference is made to the draft environmental statement for the Indian Creek Watershed Project, Lapeer, Sanilac, and Tuscola Counties, Michigan, USDA-SCS-ES-WS-(ADM)-74-29-(D).

We note that the Indian Creek Watershed is located in the Flint River Subbasin. Based upon the general information provided in this report, the extent and location of the proposed project should preclude any significant effect upon the Corps' flood Control project in the Flint River at Flint, Michigan.

It is noted that the interest rate used for amortizing installation costs and discounting future benefits was 6-7/8 percent. Recent Water Resource Council guidelines provide for an interest rate of 5-5/8 percent.

Thank you for the opportunity to review this statement. We hope that these comments will be of assistance in the preparation of the final environmental statement.

Sincerely yours,

P. McCALLISTER
Chief, Engineering Division

Copy furnished: Mr. Steven D. Jellinek, Staff Director, Council on Environmental Quality, 722 Jackson Place, N.W., Wash., D.C. 20006



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20201

*Indian Creek
Env. St.*

APR 30 1974

Mr. Arthur H. Cratty
State Conservationist
Soil Conservation Service
U. S. Department of Agriculture
1405 South Harrison Road, Rm. 101
East Lansing, Michigan 48823

Dear Mr. Cratty:

This will acknowledge receipt of your letter dated April 25, transmitting the draft Environmental Impact Statement for the Indian Creek Watershed Project, Lapeer, Sanilac, and Tuscola Counties, Michigan, USDA-SCS-ES-WS-(ADM)-74-29-(D).

We have forwarded this statement to Mr. Mitchell Cobey, the Regional Environmental Officer in this area, and he will respond directly to you.

It would be helpful to us in our efforts to provide timely comments on draft statements if you would forward future requests directly to this office. Our mailing address is:

Note



Office of Environmental Affairs
Department of Health, Education, and Welfare
330 Independence Ave., S.W., Room 4740
Washington, D. C. 20201

We appreciate the opportunity to comment on this statement.

Sincerely,

Charles Custard

Charles Custard
Director
Office of Environmental Affairs



(ER-74/617)

95

United States Department of the Interior

OFFICE OF THE SECRETARY

NORTH CENTRAL REGION
536 SOUTH CLARK STREET
CHICAGO, ILLINOIS 60605

June 17, 1974

Mr. Arthur H. Cratty
State Conservationist
Soil Conservation Service
Room 101, 1405 South Harrison Rd.
East Lansing, Michigan 48823

Dear Mr. Cratty:

Thank you for your letter of April 29, 1974, requesting our views and comments on a watershed work plan and draft environmental statement for the Indian Creek Watershed Project, Lapeer, Sanilac, and Tuscola Counties, Michigan. We have completed our review of these documents and submit the following comments for your consideration and use.

WORK PLAN

We are opposed to the proposed channelization of Indian Creek. Even though Indian Creek is small and has been modified in previous years, wildlife habitat has reestablished itself along the channel. The continual modification of streamside habitat places stress on wildlife resources and habitat of the area.

Our specific comments concerning the work plan are as follows:

Page 18, Plant and Animal Resource Problems, Paragraph 1--Flooding of nests, denning, and cover areas for wildlife does occur near the channel area; however, flooding is a natural phenomenon and riparian wildlife populations normally do not suffer, over the long term, from seasonal flooding.

Page 23, Land Treatment, Paragraphs 3, 4, and 6--The paragraphs should define the extent to which each of the practices will be used such as outlined in respect to forest land (paragraph 5, page 23).

Page 45, Structural Measures, Paragraph 3--In respect to the thought that channelization will lower the flood hazard to wildlife, please refer to our previous comment on Plant and Animal Resource Problems. It should be noted too, that the brush piles which will be placed along 4.9 miles of channel will offer only temporary cover for wildlife.

We do not agree that construction activity will result in a temporary relocation of wildlife as implied in this paragraph. This could only be realized if wildlife populations in the adjacent areas were well below the ecological carrying capacity for the species involved.

Page 45, Structural Measures, Paragraph 4--This paragraph indicates an increase of wildlife habitat in the channel right-of-way. We question whether the resulting increase in wildlife habitat will support as much wildlife and the diversity of wildlife that presently exist in the channel right-of-way.

Page 68, Fish and Wildlife Investigations, Paragraph 5--The word "negligible" used in the first sentence should be replaced by the word "low". Negligible implies that spawning of northern pike in the spring and the production of forage fish in Indian Creek is unimportant. The classification of a stream as second quality warm water does not mean that the fishery of the stream will not be affected by stream modification. In fact, channelization will have adverse effects on stream fisheries, regardless of the species composition.

We request that the enclosed report of the Fish and Wildlife Service of November 15, 1972, accompany this work plan when it is forwarded to the Congress.

DRAFT ENVIROMENTAL STATEMENT

The following specific comments relate to the draft environmental statement and should be addressed in the final statement.

Page 3, Land Treatment, Paragraphs 3, 4, and 6--These paragraphs should define the extent for which each of the land treatment practices will be used as is outlined in respect to forest land (paragraph 5, page 3).

Page 5, Structural Measures, Paragraph 1--This paragraph should specify what species of "cool season perennial grasses" are to be seeded. The value of these reseeded areas to wildlife will depend on the species composition and the kind of maintenance work performed.

Page 12, Structural Measures, Paragraph 5--It is asserted that no known cultural values will be adversely affected. However, the statement lacks evidence of consultation with the State Archaeologist (Dr. James E. Fitting, Michigan History Division, Michigan Department of State, 208 North Capitol Avenue, Lansing, Michigan 58918) or any indication of the adequacy of previous archaeological survey coverage in the area. Dr. Fitting should be consulted for information and recommendations concerning archaeological values in the project area. It may be necessary to conduct a professional archaeological survey of all areas to be affected in order to locate and assess presently unrecorded cultural values in the area of the proposed project. If it is determined that any such remains will be adversely affected by the proposed action, measures should be taken to preserve the endangered remains or to mitigate the impact through professional archaeological salvage excavation. The statement should detail arrangements that have been made to provide for such a survey and mitigation, if necessary.

Page 29, Archaeological and Historical Resources, Paragraph 3--The statement should clearly reflect that the State Historic Preservation Officer (Mr. Samuel Milstein, Acting Director, Recreation, Department of Natural Resources, Mason Building, Lansing, Michigan 48926), was consulted to determine whether the proposal will affect any cultural site which may be in the process of nomination to the National Register of Historic Places. Also, the statement should contain a copy of his response.

Page 42, Structural Measures, Paragraph 1--We do not agree with the second sentence that states ". . . aquatic and semi-aquatic species of plants, invertebrates and vertebrates, will benefit on a long-term basis . . ." To our knowledge, channelization has seldom, if ever, benefited a natural aquatic community, even over the long term.

Page 42, Structural Measures, Paragraph 4--This paragraph indicates an increase of wildlife habitat in the channel right-of-way. We question whether the resulting increase in wildlife habitat will support as much wildlife and the diversity of wildlife that presently exists in the channel right-of-way.

The wildlife value of 63.6 acres of channel right-of-way will depend greatly upon the species composition of the newly created grassland, and the kind of maintenance work performed along the right-of-way. The habitat value of 220 acres of grassland which will be converted to cropland does not offset the loss to wildlife simply by providing food and cover.

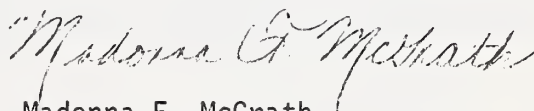
Page 42, Economic-Social, Paragraph 5--The statement should be amended to include discussion of all mineral resources in the project area as well as the potential impact of the project on future mineral production.

Page 44, Favorable Environmental Effects, Item 1--Temporary floods such as those which occur in Indian Creek Watershed do not present a long-term hazard to wildlife habitat.

Page 44, Favorable Environmental Effects, Item m--It should be pointed out that the wildlife cover in brush piles along the channel is only temporary. These brush piles will diminish with time and decay.

Page 44, Adverse Environmental Effects, Item f--This statement indicates that wildlife will return to the area after the construction period; however, much of the wildlife may not reestablish because of changes in the habitat as a result of construction activities.

Sincerely,



Madonna F. McGrath
Staff Assistant to
the Secretary

Enclosure



United States Department of the Interior

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

IN REPLY REFER TO:

RB

Federal Building, Fort Snelling

Twin Cities, Minnesota 55111

November 15, 1972

Mr. Arthur H. Cratty
State Conservationist
Soil Conservation Service
Room 101--Manly Miles Building
East Lansing, Michigan 48823

Dear Mr. Cratty:

This is our fish and wildlife report on the proposed Indian Creek small watershed project in Lapeer, Sanilac, and Tuscola Counties, Michigan. It has been prepared under the authority of Section 12 of the Watershed Protection and Flood Prevention Act (68 Stat. 666, as amended). The Michigan Department of Natural Resources has reviewed our project analysis as indicated by the attached copy of a letter dated October 19, 1972, from Acting Director Gazlay.

The watershed was approved for planning assistance on May 24, 1971. Local project sponsors include the Soil Conservation Districts of Lapeer, Sanilac, and Tuscola Counties and the Indian Creek Inter-County Drainage Board. Our project analysis is based on information contained in the Preliminary Investigation Report of August 1970 and through discussions with your staff.

PROJECT DESCRIPTION

The Indian Creek Watershed encompasses 20,360 acres and is in the thumb region of east-central Michigan. The watershed drains approximately 31.8 square miles and outlets into the North Branch Flint River, approximately 2.5 miles northwest of North Branch, Michigan. The watershed can be described as generally flat to rolling, with land use consisting of approximately 56 percent cropland, 22 percent woodland, 15 percent idle land, 2 percent pasture land and 5 percent other land use.

PROJECT PLAN

Watershed problems relate primarily to agricultural interests and include flood water damage and impaired drainage on approximately 3,300 acres of land most of which is cultivated. Road and bridge damage is a problem in some areas, particularly along the lower end of Indian Creek.

There are 7.7 miles of channel modification planned for Indian Creek, of which 2.8 miles are widening and deepening and 4.9 miles consists of clearing and snagging of trees and brush from the existing channel. Of the 2.8 miles of channel widening and deepening planned, 1.9 miles will take place on Adams Drain which flows south from Tuscola into Lapeer County and outlets into Indian Creek approximately .5 mile north of Millington Road and midway between Hathaway Road and Jefferson Road. The remaining 0.9 miles of channel modification will take place on Indian Creek, beginning at Marlette Road in Lapeer County and extending south to the Chesapeake and Ohio Railroad line. Clearing and snagging of Indian Creek will begin at the Chesapeake and Ohio Railroad line and extend downstream to Millington Road in Lapeer County. It is proposed that the clearing and snagging would be done as much as possible by manual labor. Chain saws will be used to do the cutting.



To accomplish the objectives of this project, approximately 4.7 acres of prime woodland habitat will be destroyed. In areas where a substantial amount of woodland and shrub clearing is required, the woody material will be placed in piles adjacent to spoil areas.

FISH AND WILDLIFE

The fishery value of Indian Creek and Adams Drain is low, although this value is assessed on the basis of sport fishery opportunities. Since Indian Creek outlets into the North Branch Flint River, it is potentially a source of forage fish for down stream fisheries.

In order to prevent degradation of fishery habitat in the North Branch Flint River, care must be executed in preventing fishery habitat losses in its tributaries. Fortunately, the proposed sediment basin, to be located just north of where Adams Drain outlets into Indian Creek, will reduce the rate of sedimentation in Indian Creek during the construction period.

Wildlife species found in the watershed include: white-tailed deer, fox squirrel, ruffed grouse, woodcock, cottontail rabbit, pheasant, red fox, raccoon, a variety of raptors, waterfowl, and songbirds. The population densities of these species range from low to moderate. For this reason, every effort should be made to preserve and enhance wildlife habitat and prevent further degradation of the wildlife resources in this area.

Permanent wildlife habitat is restricted to trees and brush along the channel banks and in scattered woodlots. There is also wildlife habitat in low areas bordered by abandoned fields and pasture land.

There will be losses of wildlife habitat along Adams Drain where widening and deepening of the channel will extend through three woodlots and the existing brush along the stream bank will also be lost. Similar losses will occur along Indian Creek where channel modification is planned. Some habitat would be saved if clearing and spoiling were accomplished on only one side of the channel.

ENVIRONMENTAL CONSIDERATIONS

Section 2 of Public Law 91-190, the National Environmental Policy Act of 1969, states that it is among the purposes of the Act to "promote efforts which will prevent or eliminate damage to the environment and biosphere . . .".

The statements in this section of the report have been prepared under the assumption that this project would be constructed as originally planned and without benefit of a habitat replacement program. With specific reference to the items under Section 102(C) of the Act, the following applies:

Section 102

(C)(i) Environmental Impact of the Proposed Action -

The environmental impact of this proposal will result in no beneficial effects on fish and wildlife habitats. Natural streambeds and flood plains will be replaced with channels to contain flood waters. This will result in floods moving downstream at a faster rate and peaking at a higher level in downstream areas.



(C)(ii) Adverse Environmental Effects Which Cannot be Avoided Should the Proposal be Implemented -

The proposed channelization clearing and snagging project in the Indian Creek Watershed will destroy 13.6 acres of trees and brush to accomplish project objectives. As a result of channeling 1.9 miles of Adams Drain, a complete destruction of the forage fisheries habitat will occur, and at least one half of the wildlife habitat along the banks of the drain will be destroyed. Channelization will occur on 0.9 miles of Indian Creek. The channelization of this stream will degrade the natural aesthetic value of Indian Creek. It also will subject the remainder of Indian Creek downstream to degradation by increased sedimentation from the construction area. The clearing and snagging of 4.9 miles of Indian Creek will further degrade wildlife habitat of the area by the removal of 8.9 acres of shrubs and trees along the channel.

(C)(iii) Alternatives to the Proposed Action -

Alternative actions proposed by the Bureau of Sport Fisheries and Wildlife are included in the recommendation section of this report.

(C)(iv) Relationship Between Local Short-term Uses of Man's Environment and the Maintenance and Enhancement of Long-term Productivity -

The implementation of the present project plan would result in the destruction of 13.6 acres of trees and shrubs valuable as wildlife habitat, and the channelization of 0.9 miles of natural free-flowing stream, which are valuable commitments of the natural resources to this project.

(C)(v) Irreversible and Irretrievable Commitments of Resources Which Would be Involved in the Proposed Action Should it be Implemented -

The destruction of 0.9 miles of natural occurring stream habitat of Indian Creek will be subject to deterioration due to sedimentation from the construction area. The destruction of 4.7 acres of prime woodland habitat combined with the aforesaid are irreversible and irretrievable commitments of the resources to the implementation of this project.

RECOMMENDATIONS

In order to minimize losses to fish and wildlife habitat which would occur with the implementation of this project, we recommend that:

1. No channelization be accomplished on Indian Creek.



2. Channel clearing and excavating of Adams Drain be done on one side only with the vegetation on the unconstructed side left in its present natural state down to the waterline -- except for the removal of individual, pre-selected trees and snags as determined by a multi-agency field crew.
3. At least a 20-foot wide undisturbed right-of-way be planted with perennial species to provide erosion control, nesting cover, and protect other wildlife values. This strip should be fenced against encroachment of agricultural and other uses.
4. Plantings on excavated areas follow construction activity at the earliest possible opportunity to minimize soil erosion and sedimentation of stream channels.
5. A sediment basin be installed at the end of the construction area on Adams Drain to reduce the rate of sedimentation in Indian Creek.
6. Each acre of destroyed mature woodlands be replaced with $1\frac{1}{2}$ acres of planted trees and each acre of young trees and shrub growth lost, be replaced on a one for one acre basis. The arrangement of plantings and selection of species be prescribed by the wildlife division of the Michigan Department of Natural Resources and indicated in the Environmental Impact Statement.
7. Preselected trees be left on the construction side of the channel to provide shade cover for aquatic habitats. Selection of these trees should be made by a multi-agency, Soil Conservation Service, Michigan Department of Natural Resources, and the Bureau of Sport Fisheries and Wildlife field crew.
8. This bureau be furnished a complete set of maps or aerial photographs showing the actual alignment and dimensions of the proposed channel work including location and extent of clearing and excavation prior to our review of the final work plan.

We request a written acknowledgement of this report specifically accepting the above fish and wildlife recommendations. If any of the recommendations are not acceptable, we request reasons for considering them unacceptable.

Should other plans be formulated that will necessitate a change in structural features, we ask that you notify us so we may conduct further studies and make additional recommendations.

Sincerely,

Travis S. Roberts

Travis S. Roberts
Regional Director

Attachment





HARRY H. WHITELEY
Chairman

CARL T. JOHNSON

E. M. LAITALA

HILARY F. SNELL

CHARLES G. YOUNGLOVE

WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING, LANSING, MICHIGAN 48926

RALPH A. MAC MULLAN, Director

October 19, 1972

Mr. Travis S. Roberts
Regional Director
Bureau of Sport Fisheries and Wildlife
Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

Dear Mr. Roberts:

Re: RB

Your recent letter transmitting a draft of the fish and wildlife report on the proposed Indian Creek Watershed Project in Lapeer, Sanilac and Tuscola counties has been reviewed by staff members.

The following comments are offered to represent our analysis. They may be transmitted to the State Conservationist, Soil Conservation Service in Michigan, along with your report in compliance with the provisions of the Fish and Wildlife Coordination Act.

Because of the nature of Michigan statutes, there is a fundamental question of whether the sponsors can comply with recommendation no. 3 and recommendation no. 6. We do not disagree with the objectives of these two recommendations, but in view of existing statutes and the anticipated land uses, we are of the opinion that voluntary compliance would be acceptable for this particular project area. Lacking a means to finance implementation of the recommended measures may block further consideration of the project or delay it until corrective legislation is passed.

The Department of Natural Resources wishes to indicate a conditional approval of your letter report on the Indian Creek Watershed Project as indicated above.

Sincerely,

A handwritten signature in cursive script, reading "A. Gene Gazlay".
A. Gene Gazlay
Acting Director



DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (G-WS/73)
400 SEVENTH STREET SW.
WASHINGTON, D.C. 20590
PHONE: (202) 426-2262

JUN 3 1974

Mr. Arthur H. Cratty
State Conservationist
Soil Conservation Service
Room 101
1405 South Harrison Road
East Lansing, Michigan 48823

Dear Mr. Cratty:

This is in response to your letter of 25 April 1974 addressed to the Department of Transportation Water Resources Coordinator concerning a draft environmental statement for the Indian Creek Watershed Project, Lapeer, Sanilac, and Tuscola Counties, Michigan.

The Department of Transportation has reviewed the material submitted. We have no comments to offer nor do we have any objection to the project.

The opportunity to review this draft statement is appreciated.

Sincerely,

R. I. PRICE
Rear Admiral, U. S. Coast Guard
Chief, Office of Marine Environment
and Systems



UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION V
1 NORTH WACKER DRIVE
CHICAGO, ILLINOIS 60606

JUN 12 1974

Mr. Arthur H. Cratty
State Conservationist
U. S. Department of Agriculture
Soil Conservation Service
1405 South Harrison Road, Room 101
East Lansing, Michigan 48823

Dear Mr. Cratty:


We have completed our review of the Draft Environmental Impact Statement (EIS) and Watershed Work Plan for Indian Creek Watershed, Lapeer, Sanilac and Tuscola Counties, Michigan which were transmitted to us on April 25, 1974. Comments on both the Draft EIS and Work Plan are attached.

We have classified our comments on the EIS as Category LO-2. Specifically, we have no environmental objections to the proposal but we believe additional information should be provided in the Final EIS, addressing the issues raised in our attached comments. The classification and date of our comments on the Draft EIS will be published in the Federal Register in accordance with our responsibility to inform the public of our views on other Federal agencies projects in compliance with Section 309 of the Clean Air Act.

Our major concerns for this proposal are the impacts upon the groundwater levels, the addition of nutrients in the watershed, and the construction phases of the project. Our comments on the Work Plan reaffirm our concerns addressed in the comments on the Draft EIS and question the justification of a project which benefits such a small portion of the watershed.

We appreciate the opportunity to review the Draft Environmental Impact Statement and Watershed Work Plan. When the Final EIS is filed with Council on Environmental Quality, please forward three copies to our office.

Sincerely yours,

For 
Donald A. Wallgren
Chief, Federal Activities Branch

Attachment
As Stated

ENVIRONMENTAL IMPACT STATEMENT COMMENTS - INDIAN
CREEK WATERSHED, MICHIGAN

Description

Only a small segment of the Indian Creek Watershed is included in this project and the protection is minimal (3 year flood). Therefore, a large segment of the watershed will remain unprotected and untreated. It was evident from our field inspection of the project area and from the EIS that the current landowners are doing little to improve drainage conditions or adopt necessary land treatment measures. Therefore, we believe that until your agency receives additional local cooperation, the project has minimal chance for success.

Environmental Impact

If completed, the project is expected to have an adverse impact upon the groundwater levels in the project area. The EIS should address the effects of lowering the groundwater upon wetlands, wooded areas, well production and surface water flows.

Consideration should be given to the potential increase in nutrient input to the surface waters from agricultural acreage and feedlot runoff due to the improved drainage conditions in the project area. The effects upon water quality in the project area and downstream should be addressed.

In Sections I and II of Indian Creek and all of Adams Drain, we suggest that construction activities be carried out when there is no flow in the ephemeral portions of the watershed. This would minimize the impacts upon water quality by reducing some of the sediment loads in these streams. Temporary sediment structures should be placed in the channel where necessary to further minimize the impacts upon water quality. Along Section II on Indian Creek, the clay soil has little resistance to erosion and poor permeability characteristics. Therefore, we suggest that organic material be mixed with this soil to improve its drainage capacity, its erosion resistance and its potential to grow grasses along the channel cut.

In areas that are wooded on both sides of a channel, we suggest that work be conducted within the channel to eliminate the need for a travelway on one side of the channel. All clearing and snagging should be undertaken during the seasons when there is no flow in the channels, and if possible spoil should be disposed outside the wooded areas.

As suggested in our letter of September 19, 1973, it would be appropriate for all tables in the EIS to include the consideration of a three-year frequency flood, since this is level of protection provided by the project.

An analysis of the spoil material should be conducted to determine the possible effects upon surface and ground water supplies.

The responsibility and schedule for maintenance of the rock drop structure and the sediment basin as well as further development of proposed structural aspects of the project, i.e. surface water drainage inlets, drop structures and sediment basins should be addressed in the EIS.

We must reiterate our concern for the inadequacy of septic systems within the project area and need for a centralized wastewater treatment plant for the Village of Clifford.

WORK PLAN COMMENTS; INDIAN CREEK, MICHIGAN

Our review of the Draft Watershed Work Plan dated March 1974 for the Indian Creek Watershed has been completed. As stated in our previous comments, it appears to us that actual benefits accruing from this project will be minimal and will affect a very small number of land owners. This opinion is based primarily on the fact that the area involved is subject to a very low demand as development property and also the acreage gained through draining is only of marginal agricultural value. These facts do not seem to justify the channelization and drainage proposed even though a favorable benefit - cost ratio has been assigned to the project.

There are several items of importance which have been omitted from the Draft Work Plan or which have not been adequately explained and therefore require further discussion. Each item is listed below. Because this Work Plan is virtually identical to the August 1973 Draft, comments submitted previously will not be repeated here. However, all comments should be addressed in future drafts. A copy of our previous comments is attached.

1. Net annual monetary benefits foregone by not implementing the project are expected to be \$13,040 (page 22, paragraph 3). This figure does not agree with that given in the previous Work Plan (dated August 1973) of \$4,500 (page 17, paragraph 2). This discrepancy should be explained.
2. The investigation and findings of the Michigan Water Resources Commission which resulted in the citation served to the Village of Clifford (page 7, paragraph 1) should be discussed in detail.
3. The Work Plan should discuss the responsibility for maintenance of the proposed rock drop structure and sediment basin. All structural aspects of the project should be more completely described.
4. As proposed, the project will have a significant effect upon the level of the water table throughout the project area. The impact of this action should be discussed, particularly in relation to impact upon wetlands, wooded areas, well production and surface water flows.
5. A discussion of present water quality conditions in the project area and the potential project effects upon surface waters should be included. Consideration should be given to adverse effects due to increased nutrient input from agricultural fields and runoff from feedlots.

**Advisory Council
On Historic Preservation**

1522 K Street N.W. Suite 430
Washington D.C. 20005

May 23, 1974

Mr. Arthur H. Cratty
State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
Room 101
1405 South Harrison Road
East Lansing, Michigan 48823

Dear Mr. Cratty:

This is in response to your request of April 25, 1974, for comments on the environmental statement for the Indian Creek Watershed Project, Lapeer, Sanilac, and Tuscola Counties, Michigan. Pursuant to its responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, the Advisory Council on Historic Preservation has determined that while you have discussed the historical, architectural, and archeological aspects related to the undertaking, the Advisory Council needs additional information to adequately evaluate the effects on these cultural resources. Please furnish additional data indicating:

Compliance with Executive Order 11593 "Protection and
Enhancement of the Cultural Environment" of May 13, 1971.

1. Under Section 2(a) of the Executive Order, Federal agencies are required to locate, inventory, and nominate eligible historic, architectural and archeological properties under their control or jurisdiction to the National Register of Historic Places. The results of this survey should be included in the environmental statement as evidence of compliance with Section 2(a).
2. Until the inventory required by Section 2(a) is complete, Federal agencies are required by Section 2(b) of the Order to submit proposals for the transfer, sale, demolition, or substantial alteration of federally-owned properties eligible for inclusion in the National Register to the Council for review and comment. Federal agencies must continue to comply with Section 2(b) review requirements even after the initial inventory is complete, when they obtain jurisdiction or control over additional properties that are eligible for inclusion in the National Register or when properties under their jurisdiction or control are found to be eligible for inclusion in the National Register subsequent to the initial inventory.

The environmental statement should contain a determination as to whether or not the proposed undertaking will result in the transfer, sale, demolition or substantial alteration of eligible National Register properties under Federal jurisdiction. If such is the case, the nature of the effect should be clearly indicated as well as an account of the steps taken in compliance with Section 2(b) (Procedures for compliance with the Executive Order are detailed in the Federal Register of January 25, 1974, "Procedures for the Protection of Historic and Cultural Properties," pp. 3366-3370).

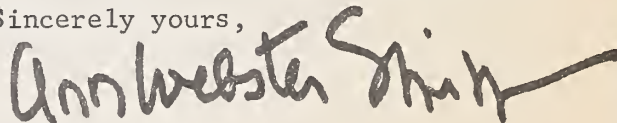
3. Under Section 1(3), Federal agencies are required to establish procedures regarding the preservation and enhancement of non-federally owned historic, architectural, and archeological properties in the execution of their plans and programs.

The environmental statement should contain a determination as to whether or not the proposed undertaking will contribute to the preservation and enhancement of non-federally owned districts, sites, buildings, structures and objects of historical, architectural or archeological significance.

To insure a comprehensive review of historical, cultural, archeological, and architectural resources, the Advisory Council suggests that the environmental statement contain evidence of contact with the appropriate State Historic Preservation Officer and that a copy of his comments concerning the effects of the undertaking upon these resources be included in the environmental statement. The State Historic Preservation Officer for Michigan is Mr. Samuel Milstein, Acting Deputy Director-Recreation, Department of Natural Resources, Mason Building, Lansing, Michigan 48926.

Should you have any questions or require any additional assistance, please contact Jordan Tannenbaum (202-254-3974) of the Advisory Council staff.

Sincerely yours,



Ann Webster Smith
Director, Office of Compliance

FEDERAL POWER COMMISSION
REGIONAL OFFICE

United States Custom House
610 South Canal Street - Room 1051
Chicago, Illinois 60607

*Indian
Creek
Env. Impact
St.*

May 6, 1974

Arthur H. Cratty
State Conservationist
Soil Conservation Service
United States Department of Agriculture
Room 101
1405 South Harrison Road
East Lansing, Michigan 48823

Dear Mr. Cratty:

We have reviewed the Draft Environmental Statement for the Indian Creek Watershed Project, Lapeer, Sanilac and Tuscola Counties, Michigan, USDA-SCS-ES-WS-(ADM)-74-29-(D) furnished with your letter of April 25, 1974.

This office's principal concern with improvements affecting land and water resources is the possible effect of such improvements on the construction and operation of bulk electric power facilities, including hydroelectric developments, and on natural gas pipelines. Since there are no hydroelectric developments or potential developments in the basin or downstream from it, nor does the work plan which accompanied the statement indicate that any gas pipelines will be affected, we have no comments regarding this draft statement.

Thank you for the opportunity to comment on this Draft Environmental Statement. We will appreciate receipt of similar statements prepared for future projects.

Very truly yours,

Lenard B. Young

Lenard B. Young
Regional Engineer



Great Lakes Basin Commission

Frederick O. Rouse
Chairman

May 9, 1974

State of Illinois
Natural Resources Development Board
State of Indiana
Department of Natural Resources
State of Michigan
Department of Natural Resources
State of Minnesota
State Planning Agency
State of New York
Department of Environmental Conservation
State of Ohio
Department of Natural Resources
Commonwealth of Pennsylvania
Department of Environmental Resources
State of Wisconsin
Department of Natural Resources

Mr. Arthur H. Cratty
State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
1405 South Harrison Road
East Lansing, Michigan 48823

Dear Art,

This is in reply to your letter of April 25, 1974, regarding review and comment on the Draft Environmental Impact Statement for the Indian Creek Watershed Project, Lapeer, Sanilac, and Tuscola Counties, Michigan.

The staff finds that the Draft Environmental Impact Statement adequately addresses and presents the favorable and adverse environmental effects, and the socio-economic effects of the installation of the Indian Creek Watershed projects.

The statement also presents a comprehensive discussion of the alternatives to the proposed project, setting forth the difference in the environmental and economic benefits and consequences of each alternative.

The opportunity afforded the Commission to review the Draft Environmental Impact Statement is appreciated.

Sincerely,

Frederick O. Rouse
Frederick O. Rouse,
Chairman



NATURAL RESOURCES COMMISSION

HARRY H. WHITELEY
Chairman

CARL T. JOHNSON

E. M. LAITALA

HILARY F. SNELL

CHARLES G. YOUNGLOVE

WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING, LANSING, MICHIGAN 48926

A. GENE GAZLAY, Director

June 27, 1974

Mr. Arthur H. Cratty
State Conservationist
Soil Conservation Service
1405 S. Harrison Road
East Lansing, Michigan 48823

Dear Mr. Cratty:

We have reviewed the Draft Environmental Impact Statement (EIS) for the Indian Creek Watershed plan and are happy to be able to offer constructive comments. We have no objection to the project, but hope you will incorporate our comments in the Final EIS. Following are suggestions for improvement of the EIS offered by our staff.

General

It would be helpful in reviewing the EIS if comments on the resource problems of the area were confined to the section designated for this description, as found on page 31. At numerous earlier places in the section entitled "Planned Project" and "Environmental Setting" (i.e., page 5, 2nd paragraph, page 18, 4th paragraph, page 22, paragraph 4) the need for dredging and/or snagging is mentioned. This would seem repetitive and heavily oriented toward project justification.

Page 2, paragraph 2

This project has no binding contracts or agreements that will provide any assurance that adequate land treatment will be carried out on 2,750 acres of cropland, 600 acres of forest land, 270 acres of other lands. What percent of the land treatment measures are being carried out on Michigan projects? In reality, this project can take credit for only the percentage of land treatment measures expected



Arthur H. Cratty

2.

June 27, 1974

to be completed, and must subtract the additional erosion, loss of forest and wildlife habitat that will occur because the project will encourage and provide the potential for more intensive agricultural practices.

Page 5, paragraph 4

An "important wooded area" is mentioned. The significance of the woodlot is not described. The proposed plans are directed toward preserving this area yet no description of its uniqueness or resources is provided.

Page 5, paragraph 7

The standing trees along the channel which at some later date may impair the functioning of the channel as a result of windfalls will also be removed. We wonder at the wisdom of this action. The benefits the trees provide before they fall into the channel would seem to outweigh the need to cut them now.

Page 12, paragraph 5

It is difficult to understand how wetland areas will remain intact within the problem area. Completion of the present project can only accelerate privately financed drainage. Forest productivity will be increased within the area by the increased drainage. It would seem that the wetlands would also be effected. Just how will wetlands be retained?

Page 24-25

Since common names of plants and animals are often confusing from region to region, it would be helpful if scientific names were added to the lists of plants and animals.

Page 25, paragraph 3

Use by migrating waterfowl is mentioned. It should be noted that mallards, woodducks, and blue-winged teal nest in this area.

Page 25, Economic Resources

This is an improper heading. Should it not be Agricultural Resources?

Page 26, paragraph 2

If agricultural land is valued at \$220 per acre and flood plain lands at \$120 per acre would it not be much cheaper to buy the land for a valley preserve rather than spend the money for drainage?

Arthur H. Cratty

3.

June 27, 1974

Page 34, paragraph 5

In the discussion of water quality problems, decaying vegetation in the channels is listed as a major source of nutrients. Would aquatic and semi-aquatic vegetation be present in quantity in the channels to such a degree if nutrients were not already present? Is it not more likely that agricultural runoff provides a major source of nutrients?

Page 36, paragraph 1

Benefits from land treatment practices are listed. Land treatment practices may have the potential to reduce flooding but what percentage will actually be carried out? This project can not guarantee compliance. Also, will not more intensive land use on 1,324 acres plus the conversion of 220 acres from idle land to row crops increase the erosion rate? If you can quantify the effects of land treatment for which the project has no insurance of completion, then you should be able to attempt to quantify the additional erosion rates caused by the more intensive land use.

Page 36, paragraph 3

What are the forest land treatment measure impacts? Also, the claim that increased drainage will enhance the natural area aspects of forests is puzzling. Natural forest areas need not be well-drained to be aesthetically appealing. In fact, many forested areas well suited for recreation are within floodplains and not managed for wood products.

Page 36, paragraph 4

Forest practices may improve infiltration and increase water storage capacity. How will this function in proximity to deeper, straighter, larger capacity channels that lower storage capacity?

Page 42, paragraph 1

The increased use of fertilizer and pesticides is noted. The impact of this increased use should be discussed.

Page 42, paragraph 4

The wildlife habitat evaluation by SCS criteria includes only the 63.6 acres involved on the channel right-of-way. We feel that all land use changes as a result of the project should be included in the evaluation. This total evaluation would include the 220 acres that will change from grassland to crop land. Woodlands and brush are the critical habitat acreages. Grasslands and small grains in this watershed are more than sufficient. With this in mind we doubt

Arthur H. Cratty

4.

June 27, 1974

whether the total habitat loss would be "offset" by land treatment which provides some food and cover. We would suggest that the terminology be changed to "partially offset."

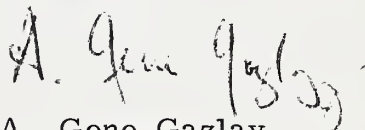
Page 43, paragraph 4

It is stated that 48 percent population increase expected in Lapeer County in 20 years will not have "significant impact." How was this conclusion arrived at?

Page 44, paragraph 1

Item "1" indicated that reduced flood hazard is a favorable wildlife effect. There are no data available to indicate than annual floods, especially in this area, are a significant hazard to the wildlife using the area. If anything, the nutrients carried onto the flood-plain may make them more productive for wildlife foods, etc. Also, the plus habitat values of brush piles, in our opinion, will not make up for the natural habitat lost.

Sincerely,

A handwritten signature in dark ink, appearing to read "A. Gene Gazlay". The signature is written in a cursive, slightly slanted style.

A. Gene Gazlay
Director

